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CONFIDENTIAL

U. S. ARMY CONCEPT TEAM IN VIETNAM
APO 143, San Francisco, California

ACTIV-AM

25 May 1963

(7) Employment of OV-1 (Mohawk) Aircraft

in Support of Counter-Insurgency Operations (U)

~~Short Title~~ (EMASCO) (U)

(9) FINAL TEST REPORT

16 October 1962 — 15 March 1963

CONFIDENTIAL

U. S. ARMY CONCEPT TEAM IN VIETNAM
APO 143, San Francisco, California

ACTIV-AM 25 May 1963

SUBJECT: Final Test Report -- Employment of OV-1 (Mohawk) Aircraft in Support of Counter-Insurgency Operations (C)

TO: See Annex D, Tab D.

1. (U) General.

The attached report covers an operational evaluation of armed Mohawk aircraft employed to provide surveillance and reconnaissance support to units engaged in counter-insurgency operations in the Republic of Vietnam (RVN) during the period 16 October 1962 - 15 March 1963.

2. (C) Background.

a. The 23d Special Warfare Aviation Detachment (Surveillance) was deployed to the RVN in September 1962 for the purposes of:

(1) Providing air surveillance in support of Republic of Vietnam forces.

(2) Serving as a "test unit" for an operational evaluation conducted by the US Army Concept Team in Vietnam.

b. Testing was conducted in accordance with a directive issued by the US Military Assistance Command, Vietnam, under date of 29 September 1962. This directive, entitled "Test Plan, AO-1 (Mohawk) Aircraft for Province/Sector Surveillance in Support of Counter-Insurgency Operations (C)," established the test parameters.

3. (U) Report format.

The report consists of an introduction, sections covering each of the several test objectives, and annexes containing supporting material. The introduction includes a summary of test results. It is designed to stand alone as a digest of the complete report.

4. (C) References.

a. Letter cited in paragraph 2b above.

b. Department of the Army letter, AGAM (M) 381 (31 Oct 62) DCSOPS, subject: "Army Troop Test Program in Vietnam (U) 6 November 1962, as amended.

c. Test Reports, Army Concept Team in Vietnam, subject: "Employment of OV-1 (Mohawk) Aircraft in Support of Counter-Insurgency Operations (C):"

Monthly Test Report Number 1, 30 November 1962.

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SUBJECT: Final Test Report -- Employment of OV-1 (Mohawk) Aircraft in Support of Counter-Insurgency Operations (C)

Monthly Test Report Number 2, 31 December 1962.

Monthly Test Report Number 3, 31 January 1963.

Monthly Test Report Number 4, 28 February 1963.

5. (U) Abbreviations.

ACTIV . . . . . US Army Concept Team in Vietnam

ARVN. . . . . Army of the Republic of Vietnam

COMUSMACV . . . . Commander, US Military Assistance Command, Vietnam

GVN . . . . . Government of the Republic of Vietnam

MAAGV . . . . . US Military Assistance Advisory Group, Vietnam

RVN . . . . . Republic of Vietnam

RVNAF . . . . . Armed Forces of the Republic of Vietnam

SWAD. . . . . Special Warfare Aviation Detachment

USASGV. . . . . US Army Support Group, Vietnam

USMACV. . . . . US Military Assistance Command, Vietnam

VC. . . . . Viet Cong

VNAF. . . . . Air Force of the Republic of Vietnam

6. (U) Table of contents.

See attached sheet.

E. L. Rowny
E. L. ROWNY
Major General, USA
Chief

ACTIV-AM
SUBJECT: Final Test Report -- Employment of OV-1 (Mohawk) Aircraft in Support of Counter-Insurgency Operations (C)

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Final Test Report -- Mohawk

SECTION I -- Introduction

1. (C) PURPOSE OF THE TEST.

To test and evaluate the 23d SMAB under field combat conditions to determine the adequacy of organization, equipment, missions, doctrine, tactics, procedures, and techniques for conducting counter-insurgency operations.

2. (C) SCOPE OF THE TEST.

Test objectives called for . . .

. . . determination of the results obtained by providing continuous surveillance over a limited area;

. . . evaluation of the suitability of the Mohawk for tactical area surveillance;

. . . determination of the nature of insurgent activities which can be detected visually and photographically from the air;

. . . appraisal of current Army doctrine, tactics, and techniques for Mohawk surveillance, and development of doctrine, tactics, and techniques for counter-insurgency operations;

. . . estimation of the adequacy of the personnel and equipment of the 23d SMAB;

. . . formulation of proposed changes to the TOE of the 23d SMAB and to pertinent technical and training literature; and

. . . determination of logistical problems.

3. (C) THE TEST ORGANIZATION.

The 23d SMAB, organized in July 1962, is a prototype armed aerial surveillance unit. Its principal components are . . .

. . . headquarters elements, including operations and communications teams and a photo processing section,

. . . three flight teams, each consisting of:

-- two armed Mohawk aircraft,

-- four officer pilots,

-- seven enlisted maintenance and armament specialists, and

-- for operations in the RVN, two to four attached ARVN air observers, most of whom were artillery officers, and

. . . service elements, including a third-echelon aircraft maintenance team, a motor maintenance team, and POL and ordnance specialists.

4. (C) CONDUCT OF THE TEST.

ACTIV-AM
Final Test Report -- Mohawk

SECTION I -- Introduction (continued)

a. Limitations.

(1) Terms of reference for the conduct of the test stated that the test activity was not to have an unfavorable impact on military operations. To insure compliance with this injunction, testing was undertaken only in connection with activities in support of actual operations, and the test unit was in no case required to undertake actions designed solely or primarily for test purposes. As a result, the "controls" normally associated with testing could not be imposed.

(2) In accordance with policies and guidance of the JCS, CINCPAC, and COMUSMACV, Mohawk activity was governed by rules of employment specifying, inter alia, that --

-- On all operational flights, a Vietnamese observer would be aboard.

-- Aircraft would be armed with .50 caliber weapons only, and armament would be used only when required to defend against a hostile attack.

b. Data collection.

The primary sources of test data were . . .

. . . operational records maintained by the test unit and by supported units;

. . . questionnaires and evaluation reports completed by ARVN commanders and US advisors; and

. . . observations of test project officers.

c. Task assignment.

The 23d SWAD was assigned to Support Group, Vietnam (USASGV) for administration and logistical support. It was under the operational control of COMUSMACV, who decided to place the Mohawks in support of the II ARVN Corps. To carry out this mission, the SWAD was deployed as follows (see also Figure 1, following) --

-- From 16 October to 22 November the entire unit was stationed at Nha Trang. It gave direct support, in priority of listing, to . . .

. . . 9th Division, Qui Nhon,

. . . 47th Regiment, Tuy Hoa, and

. . . Railway Security Agency, II Zone.

-- Between 23 November and 14 February . . .

. . . one flight team (two aircraft and 16 men) was at Qui Nhon, 100 miles north of Nha Trang, to give direct support to the 9th Division; and

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SECTION I -- Introduction (continued)

. . . the rest of the SWAD provided, from Nha Trang --

-- general support for the II ARVN Corps, and

-- surveillance over the coastal railway in II Zone.

-- From 15 February to 15 March . . .

. . . the flight team at Qui Nhon continued to support the 9th Division;

. . . one flight team (two aircraft, 18 men, and a photographic laboratory) was stationed at Quang Ngai, 200 miles north of Nha Trang, to give direct support to the 25th Division; and

. . . the remainder of the SWAD, still at Nha Trang, continued to provide --

-- general support for the II ARVN Corps, and

-- surveillance over the coastal railway in II Zone.

d. Flight mission assignment.

Flight missions were given directly to the 23d SWAD and its detached flight teams by the supported units (via the US advisors with those units). There was no requirement for approval by a higher headquarters. The support given by 23d SWAD elements to ARVN divisions was analogous to the relationship between a US infantry brigade and its direct support artillery battalion.

5. (C) THE TEST ENVIRONMENT.

a. Physical factors.

The II Corps tactical zone, in which the 23d SWAD operated, includes three distinct types of terrain --

-- Coastal plain, primarily agricultural and relatively densely populated.

-- Rugged mountains, 2000 to 6000 feet high, with forested or jungle slopes.

-- Plateau area, open or lightly forested.

The mountains and plateau area are sparsely populated, largely by Montagnard tribes.

The test period coincided with the northeast monsoon which produces the annual wet season along the coast. Low ceilings and broken clouds frequently obscured the mountain peaks and ridges during this period.

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TAB I

SECTION 1 --- Introduction (continued)

b. Military considerations.

For the conduct of military operations, the RVN is divided into four corps areas, each of which is unique in terms of terrain, weather, and the amount and type of insurgent activity. Within the framework of an overall national plan, each corps has objectives and priorities for their accomplishment. Military operations are oriented on the insurgents rather than on terrain objectives as such. Because the enemy is ubiquitous and concentrates quickly against widely-scattered villages and hamlets, response to insurgent attack must be rapid. Follow-up action once contact has been made with the elusive enemy - who avoids battle except on his own terms - must be equally swift. Because of this, ground operations are decentralized; regimental, battalion, or company-size actions are preferred; coordinated division or corps operations have been found to be less productive and are becoming less frequent. The military situation is adapted to the task of defending a large number of widely-separated areas and operating offensively whenever possible. In short, it follows the pattern of counter-insurgency: decentralized and compartmentalized.

6. (C) SUMMARY OF MISSION STATISTICS.

During the test period the 23d SWAD . . .

. . . flew 2168 hours (for a monthly average of 80 flight-hours per aircraft) in performing 778 combat support missions of the following types ---

--- railroad surveillance . . . 239

--- visual observation 235

--- photographic 176

--- search and rescue 64

--- helicopter observation . . 41

--- night illumination 14

--- convoy observation 9

. . . delivered 33,370 photo prints to supported units;

. . . adjusted artillery fire 71 times;

. . . received hostile fire on 39 occasions;

. . . fired defensively on 27 occasions;

. . . suffered nine hits;

. . . maintained an average aircraft availability rate of 79%.

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SECTION I -- Introduction (continued)

7. (C) THE SURVEILLANCE CONCEPT.

The plan of test called for the 23d SWAD to . . .

. . . conduct "continuous surveillance of a limited area;"

. . . "maintain a minimum of one aircraft airborne over the selected tactical area during daylight hours;" and

. . . "conduct night operations as necessary."

It became evident early in the test period that the supported units, who were in complete control of the use of the aircraft irrespective of the test objectives, preferred to assign flight missions that would be most productive in terms of their critical air observation needs. They pointed the capabilities of the 23d SWAD toward development of information responsive to specific EEI for tactical situations. The unit, therefore, did not carry out systematic surveillance on a schedule which could insure an even distribution of effort over a large "selected tactical area" (i.e., province). Attempts to persuade the supported units to explore the possible benefits to be derived from systematic, even distribution over large areas were abandoned after it became abundantly clear that the pay-off from such surveillance was small. Instead, the Mohawks soon found themselves furnishing <u>continuous support</u> to commanders who called for:

. . . Specific reconnaissance sorties,

. . . within their tactical areas,

. . . according to their needs.

Within each province in the II ARVN Corps tactical zone there are . . .

. . . areas controlled by the GVN,

. . . areas controlled by the VC, and

. . . areas contested by both sides but controlled by neither.

Most of the 23d SWAD reconnaissance missions covered contested or VC-controlled areas. These regions are not easily penetrated by agents, so that aerial surveillance was a primary source of intelligence.

Methods of SWAD employment included . . .

. . . intensive surveillance over a limited area to obtain information needed for forthcoming ground operations;

. . . reconnaissance to determine the need for and possible objectives for search-and-clear actions;

. . . close surveillance of known or suspected VC concentrations to disrupt insurgent movements and subject them to air-adjusted artillery fire when groups were located and identified (a technique that was particularly successful in Quang Ngai Province);

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:TION I -- Introduction (continued)

. . . use as quick-reaction visual investigators of reported attacks or harassments (including the use of illuminating flares for ssions conducted at night);

. . . continual close surveillance, though at random times, of ıe railroad,

. . . use as air observation posts for ARVN forces in contact ıth the VC.

8. (C) TEST RESULTS.

Test results are summarized below under headings corresponding to est objectives. Detailed discussions are presented in Sections II through III, following.

a. Area surveillance.

The test plan required assessment of the results of aerial surveillance in terms of . . .

. . . reduction in VC incidents,

. . . restrictions to VC movement, and

. . . increase in Vietnamese response and effectiveness.

The three geographical areas analyzed were . . .

. . . Binh Dinh Province (for five months),

. . . Quang Ngai Province (for one month), and

. . . the Trans-Vietnam coastal railway (for four months).

In each area, elements of the 23d SWAD were employed under the direction of the military commander (through the US advisor) as an integral part of the total available forces. In all three areas, VC incidents decreased in either number or intensity or both. Because of the many variables involved, the specific contribution of the Mohawks to the reduction of these incidents could not be quantified, but the thesis that the presence of Mohawks overhead inhibited insurgent activity was verified by several reports from GVN elements. These reports stated that the VC broke off contact upon arrival of a Mohawk overhead. Corroborating evidence was derived from statements of two VC prisoners who said their units moved from areas which had been subjected to repeated Mohawk observation.

It appears uncontestable that 23d SWAD surveillance did restrict or inhibit VC activity. However, no accurate methods were discovered for determining the degree of restriction imposed.

Visual and photographic reconnaissance produced a wealth of intelligence for supported units. Hundreds of structures, most of them camouflaged, were detected in suspected VC base areas. Likewise, hundreds of people were

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SECTION I -- Introduction (continued)

sighted in suspect areas, and, because of the detailed familiarity of Mohawk crews with operational situations and local activity patterns, some of the people sighted could be identified as insurgents.

Supported units frequently called upon Mohawk crews to confirm information obtained from other sources.

ARVN observers in the Mohawks directed placement of artillery fire on identified targets 71 times. The percentage of 25th Division artillery fires which were observed was nearly tripled (21% to 59%) by activities of Mohawk observers. It is not claimed that the ability to adjust artillery fire was unique to the Mohawk. What was unique was the combination of the capabilities of this aircraft and the skill developed by the crews in finding and identifying suitable and profitable targets. The ensuing adjustment of artillery fire was an incidental contribution.

Supported units quickly developed effective air-ground procedures to exploit the capabilities of the immediately-available SWAD aircraft.

It was concluded that continuous support by the 23d SWAD was highly effective and substantially increased the operational capabilities of the supported ARVN units.

b. Suitability of the aircraft.

The counter-insurgency reconnaissance-surveillance aircraft must be able to . . .

. . . GET to an area quickly,

. . . Be capable of surprising the enemy,

. . . SEE and SENSE:

. . . IN the low-level envelope of optimum effectiveness

. . . WITH a high probability of survival

. . . and must be adaptable to forward-area basing and maintenance.

Visual observation is particularly significant in counter-insurgency operations because it alone can provide the means for . . .

. . . sustained contact,

. . . on-the-spot target analysis,

. . . immediate reporting of findings, and

. . . provide a guide service for forces reacting to findings.

Mohawk design provided excellent air-ground visibility by virtue of . . .

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TAB I

. . . side-by-side seating;

. . . a panoramic view forward and to each flank; and

. . . a field of view straight down through the bulging side hatches.

The integral Mohawk camera system proved suitable for large-scale, low-level photography of points, strips, and limited areas. In addition, to handling assigned photo missions, Mohawk crews photographed targets of opportunity on 74 occasions. The camera system is not intended for or adaptable to large-area photography, and it could not take the forward-looking oblique shots that in some instances would have been useful.

It was determined from experience that the optimum altitude range for detection and identification of insurgent targets was from tree-top level to 1500 feet above the ground. The Mohawk was effective in this low-level envelope principally because of its . . .

. . . speed range (from less than 100 to more than 200 knots);

. . . speed-noise relationship (which allowed the aircraft to get within observing distance of people on the ground without alerting them to its presence);

. . . maneuverability (including, in particular, the short turning radius required for effective reconnaissance in compartmentalized mountain terrain);

. . . endurance (allowing flights of four hours with external fuel tanks, two hours without them); and

. . . communications spectrum (including UHF, VHF, and FM radios -- and FM homing equipment).

Experience during the test period developed in Mohawk crews a high degree of confidence that their aircraft could penetrate VC-controlled areas, operate within kill range of small arms ground fire, obtain information, and return safely. Design features that enhance survivability include . . .

. . . wide speed range;

. . . a speed-noise relationship that minimized the amount of reaction time available to hostile firers;

. . . twin engines;

. . . armor protection for the crew;

. . . zero-altitude ejection seats;

. . . duplicate control cables;

. . . self-sealing fuel tanks; and

. . . armament.

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SECTION I -- Introduction (continued)

Defensive fire was delivered 27 times. Hostile ground fire had to be supressed on those occasions to insure completion of the missions. The only other options available to the Mohawk crews were to accept the risk of unopposed ground fire or abort the missions; neither of these alternatives were acceptable.

During the test period, the 23d SWAD flew more than 2000 hours in the performance of 785 combat support missions. It lost two aircraft. The cause of loss was not determined in either case.

While the SWAD was deployed at three separate locations, with two aircraft at each, it averaged 100 flight-hours per month per aircraft. This statistic is indicative of the relative ease with which Mohawks can be maintained under field conditions.

The test revealed that the Mohawk is well suited to the needs of a counter-insurgency situation. Modifications and developments that would give the aircraft even greater capability and versatility are discussed in Section III.

c. Insurgent activity detected visually and photographically.

Items seen and photographed by Mohawk crews included people, installations, structures, fortifications, training areas, obstacles, trails, bridges, cultivated areas, and domestic animals; armed groups were observed (and photographed in some cases) marching, resting, fighting friendly ground forces, and firing at the aircraft; other people were observed while engaged in support-type activities such as tilling fields and carrying supplies.

d. Doctrine, procedures, tactics, and techniques.

This objective calls for assessment and development of Army doctrine, procedures, tactics, and techniques for employment of the Mohawk.

It has been shown that the 23d SWAD performed effective reconnaissance. Analysis of how this was done provided data responsive to the objective.

(1) Employment.

Flight teams were employed in direct support of divisions; the aircraft were based at airstrips adjacent to the divisions' command posts; missions were assigned directly from the divisions to the flight teams. This method of employment was consistent with US Army doctrine calling for aviation units to be organic to tactical units -- when habitual use and unit missions so dictate -- and for the force commander to use aviation in the way that best contributes to the accomplishment of his mission.

(2) Procedures.

Each of the supported units used slightly different procedures for the control and direction of the Mohawk effort. Procedures used by the 25th Division are described in Section V. The essential features were --

-- Positioning a 23d SWAD duty officer in the G2 and G3 advisors' offices and giving him a ground-mounted FM radio for aircraft control and diversion of airborne aircraft to missions of higher priority.

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SECTION I -- Introduction (continued)

— Daily G2 - G3 briefings of Mohawk crews. US pilots were briefed by advisors, ARVN observers by ARVN staff officers. Mission briefings and debriefings were conducted in the same manner.

— Establishment of a division air-ground FM frequency which was used for spot reports from Mohawks to ground units and for instructions and requests from ground units to Mohawks.

Approximately 50% of the Mohawk missions were assigned on the day or evening before they were to be flown.

Nearly 40% were assigned on the day they were to be flown -- to follow-up or react to fresh information.

The remaining 10% (usually photo missions) allowed more than 24 hours lead time.

(3) Tactics.

During the first three months of the test, nearly all missions were performed by aircraft operating singly. This was believed to increase the probability of surprise and facilitate the detection of insurgents. In addition, the unit covered a greater number of widely separated targets than if the aircraft had operated in pairs. During that period, the aircraft received hostile fire only seven times in 442 combat support missions.

In the later stages of the test, frequency of insurgent ground fire increased — the two Mohawks operating in Quang Ngai Province received fire 26 times in 29 days. Because of the increased risk, the unit shifted to employment of aircraft in pairs as the normal practice.

On shallow penetrations, when stealth is essential and known insurgent automatic weapons emplacements can be avoided, use of a single aircraft appears to be justified. Deep penetrations into known insurgent base areas from which anti-aircraft fire frequently is received should be performed by a team of two aircraft.

(4) Techniques.

The area search technique used with most success called for an initial scan of the area from about 15[illegible] feet absolute altitude, followed by a detailed search of suspect areas from lower heights. When people were seen on the ground, an immediate effort was made to determine their status. Positive identification of insurgents was possible only if they . . .

. . . fired on the aircraft or at friendly forces; or

. . . wore distinctive uniforms previously identified as VC; and were armed and were detected in an area habitually occupied by VC and at a time when it was known that no GVN forces were operating in the area; or

. . . were armed and were occupying previously-identified VC fortifications or emplacements at a time when it was known that no GVN forces were operating in the area.

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SECTION I -- Introduction (continued)

In the cases of the last two conditions mentioned, it is evident that a correct assessment could be made only by crews who were thoroughly familiar with . . .

. . . the area,

. . . the local VC habits and order of battle, and

. . . the capabilities and current situation of friendly forces.

Continuous employment in the same tactical area and attendance at daily situation briefings at the division command post gave the Mohawk crews the background for making correct assessments of the status of people detected from the air.

(5) Responsiveness.

Thirty per cent of the missions performed for supported divisions were requested to be flown within ONE HOUR of receipt. These requests were filled 62% of the time. Photographs were delivered in as little as THREE HOURS to meet the exigencies of certain tactical requirements. Normally, however, photographs taken during the day were processed during the night for delivery on the following morning. In only ten per cent of the missions requested did the divisions feel they could wait longer than 24 hours for results.

In a considerable number of cases -- i.e., eight times in one month in the case of the flight team with the 25th Division -- airborne Mohawks were diverted in flight to missions of higher priority. Further, numerous add-on tasks were performed in response to requests from ground units which radioed to Mohawks flying overhead en route to other missions. In most instances, these requests called for the aircraft to investigate a nearby area for signs of insurgent activity. Such requests usually could be handled without prejudice to the primary mission assigned the Mohawks.

(6) Usage.

The flight teams in direct support of divisions averaged 117 sorties and 215 flight-hours per month -- a quantity of support that could meet most of the requirements of the divisions. Through rotation, the flight teams were kept at two flyable aircraft each. Major maintenance, including periodic inspections, was performed at the unit base at Nha Trang.

Since average Mohawk availability during the test period was 79%, it was inferred that a detachment of eight aircraft would be required to maintain one flight team, with two flyable aircraft in support of each of the three divisions of the II ARVN Corps. For I and III ARVN Corps, which have similar operational and physical environment, but only two divisions each, supporting detachments of five Mohawks for each Corps would be needed. The IV ARVN corps, with its two divisions, operates in the Mekong Delta, a quite different tactical and physical environment, and one in which the 23d SWAD had no experience. No estimate was made of the number of Mohawks that would be needed to support this corps.

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SECTION I -- Introduction (continued)

A major reason for the effectiveness of 23d SWAD activities was the decentralized employment of its elements in direct and continuous support of divisions, with consequent development of area familiarity, integrated air-ground teamwork, and the creation of workable standing operating procedures.

It was concluded that Army doctrine calling for this method of employment is well suited to a counter-insurgency environment.

e. Adequacy of personnel and equipment.

Activities undertaken during the test period disclosed that the TOE of the 23d SWAD is adaptable to the tasks imposed in counter-insurgency operations. Some inadequacies were revealed. There is a need for --

-- An officer for full-time supervision of unit personnel and supply administration.

-- A utility aircraft for command liaison and for logistical support of detached flight teams.

-- A photographic laboratory for each flight team and two photo processing specialists per laboratory. (Only one laboratory, with two specialists, is now authorized by TOE. Each detached flight team must have photo processing facilities if it is to be fully responsive to the demands of the supported unit.)

-- Additional radios for the communications and flight teams.

-- Two engineer equipment repairmen.

f. Training and technical literature.

There are no Army publications that give adequate technical and training guidance for the operation and maintenance of Mohawk armament systems. Army publications are needed, particularly to eliminate the need for cross-referencing of parts numbers from Navy publications and Army supply manuals.

g. Logistical problems.

Mohawk availability averaged 79%. Two-thirds of the aircraft down time was caused by parts shortage (EDP). The organic field maintenance capability of the detachment was essential to the maintenance of a high aircraft availability rate.

Detailed time studies conducted during two separate periods totaling three weeks yielded the following ratios of maintenance man-hours to aircraft flight hours --

-- 3.4 to 1 for organizational maintenance of aircraft

-- 2.2 to 1 for field maintenance of aircraft

-- 1.6 to 1 for armament maintenance

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SECTION I -- Introduction (continued)

A survey of action taken on requisitions for repair parts indicated that the initial 180-day support package is not being adequately replenished. The supply pipeline should be geared to support a Mohawk flying-hour program of 100 hours per aircraft per month.

9. (C) EXTRA-TEST OBSERVATIONS.

US advisors and supported unit commanders frequently remarked on the advantages that would accrue if Mohawks could be authorized to use armament offensively against identified insurgents. Although it was recognized that such a method of employment may never be applicable in the RVN, the potential military advantages of a reconnaissance aircraft with a strike capability were evidenced almost daily.

Mohawk effectiveness in locating insurgent targets was amply demonstrated during the test period. The paramountcy of finding is patent: the enemy must be found before any action against him can be mounted.

The design features that allow the Mohawk to see and survive in the optimum reconnaissance envelope (e.g., speed range, speed-noise relationship, twin engines, armor protection, etc.) also contribute to a capability for delivering conventional air-to-ground ordnance of types and in amounts suitable for most counter-insurgency targets.

In a situation that calls for discriminating fires to be applied against targets that are difficult to detect and identify, delivery of fire by the same agency that detects and identifies is desirable. This method . . .

. . . eliminates time delays and

. . . reduces the possibility of errors,

both of which hazards are inherent in systems that require the detection agency to call upon a second agency to deliver fire. When insurgent targets -- often fleeting and quick-to-disappear -- are found and determined to be suitable for engagement by fire, that fire usually can best be delivered by the reconnaissance vehicle itself, as the target may be gone before other means of firepower can be brought to bear.

Such a multi-purpose aircraft could be expected to rate high on a cost-effectiveness scale. It could work practically full time at its reconnaissance tasks -- occasional delivery of ordnance would detract little from the primary mission. It would have no "non-productive" time -- either because it was a "pure" reconnaissance aircraft locating or identifying targets, or because it was a "pure" strike aircraft held on ground or air alert while the former aircraft located and identified targets for it.

Assignment of both the reconnaissance and strike functions to a single aircraft appears to be completely feasible. No claim is made that the Mohawk is the ideal aircraft to carry out this combination of functions, but a study of Mohawk features and performance should be of benefit to persons concerned with design of future aircraft for counter-insurgency use.

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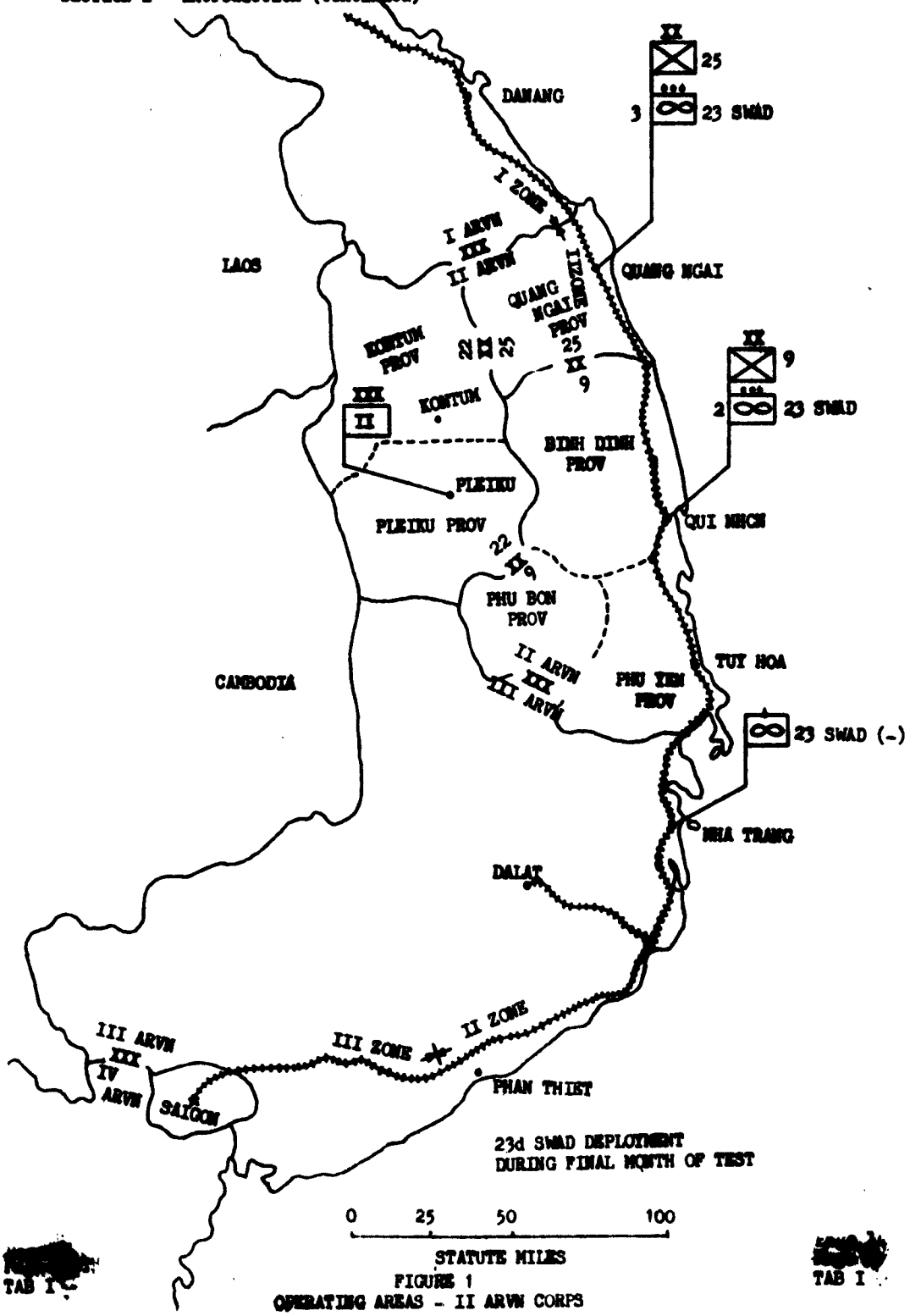

TAB I

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FIGURE 1
OPERATING AREAS - II ARVN CORPS

ACTIV-AM
Final Test Report -- Mohawk

SECTION II — Objective 1 (Area surveillance)

1. (C) OBJECTIVE.

"To determine the results obtained by providing continuous surveillance to a limited area; i,e., reduction in VC incidents, restrictions to VC movements, increase of RVNAF (Republic of Vietnam Armed Forces) response and effectiveness."

2. (C) DISCUSSION.

a. Clarification of terms.

For this report, "continuous surveillance" denotes continuous support by elements of the 23d SWAD to a designated tactical unit, whose commander controlled and directed the surveillance effort. "Limited area" denotes the zone or area that is the tactical responsibility of the commander of the supported unit.

b. Need for aerial surveillance.

In order to evaluate the results obtained by aerial surveillance, the need for such support must be considered.

The VC insurgent in the II Corps (ARVN) zone, is a highly mobile and extremely elusive enemy, adept in the use of cover and concealment afforded by the environment in which he lives. His fixed bases are difficult to locate and identify. The rugged jungle and mountains in this area give the insurgent opportunities to organize his forces and to move about with small risk of detection and restriction.

The difficulty of obtaining information on VC activities is pointed up by the senior US advisor to the 25th Division (see Tab A-2). He writes:

"Quang Ngai Province is recognized as being one of the most heavily infested areas in Vietnam. It has been under VC domination since the signing of the Geneva Accords in 1954. Even before that time, the French were unable to control the populace and the area."

"Before the arrival of the Mohawk aircraft, the collection effort at division level consisted of agent reports from the S2's of divisional units, sectors and units under sector control, supplemented by reports from District Chiefs, the National Police, the Military Security Service, and para-military organizations. The majority of information from all sources consisted of reports of agents who normally have not been trained in observation and reporting and whose means of communication were generally limited to foot or bicycle messengers. Reporting was generally three to five days or more in arrears. Intelligence other than by agents consisted largely of observations made by the units as they traveled through target areas and to a limited extent of information received from these sources. It should be noted that a large part of the province is inaccessible by road and that military operations in this area have to this date been limited by the availability of combat forces."

SECTION II -- Objective 1 (continued)

It is clear that reduction of VC activities and effective operations against the insurgents require timely and detailed information concerning the location and activities of the enemy. Then there must be prompt reaction against insurgents when they are located and identified.

c. Areas supported.

The 23d SWAD has provided continuous support in three areas:

Binh Dinh Province, 15 October 1962 - 15 March 1963.

Quang Ngai Province, 15 February - 15 March 1963.

Trans-Vietnam Railway System, II Zone, 1 November 1962 - 15 March 1963. Coverage was extended to include Quang Ngai Province during period 21 January - 15 March 1963.

d. Analysis of VC incidents.

Although there has been an overall reduction in the incident rate in those areas in which Mohawk area surveillance has been conducted, it is impossible to quantify the effect of any one factor. An analysis of the VC incident rate in each test area follows:

(1) Binh Dinh Province.

In four months of 23d SWAD operations, monthly incident rates have not exceeded the variance limits of the past 10 months (see Tab B-1). However, the scale of incidents decreased in intensity during January and February. Of the 41 V harassments in February, 34 were related to undefended, strategic or combat hamlets. Most were relatively ineffectual, consisting mainly of fence-burning or harassing fire. Many occurred in areas of presumed GVN control where only limited Mohawk surveillance was performed. The preponderance of aerial surveillance provided by the 23d SWAD was conducted in areas not under GVN control for the purpose of developing intelligence for tactical operations.

(2) Quang Ngai Province.

During the one month of 23d SWAD operations in Quang Ngai the number of VC incidents decreased sharply (see Table B-2, Tab B-1). This decrease is attributed to three factors: operations of the 23d SWAD flight team, the end of the rainy season, and the increased tempo of ARVN operations.

(3) Trans-Vietnam Railway.

In four months of 23d SWAD railway surveillance, the number of railway incidents decreased to approximately half the average for the preceding five months (monthly average 7.5 versus 14) (see Tab B-1). Graphs showing the correlation between the times of incidents and times of surveillance are shown in Figures B-1 through B-4, Tab B-1. In the zones covered by surveillance:

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SECTION II -- Objective 1 (Area surveillance)

(a) There were no attacks or attempts to capture or loot trains (see Tab A-5 and Tab A-5a).

(b) There were no daylight actions against trains in November, one in December and January, and two in February (see Tab A-5 and Tab A-5a).

e. Restrictions to VC movements.

(1) The following information obtained from insurgent prisoners is direct evidence of the inhibiting effect of aerial surveillance:

(a) On 14 March 1963, eight VC were captured in the vicinity of BS776351, Quang Ngai Province. They claimed they hid their weapons and moved to that location to escape from artillery and Mohawks.

(b) A VC, captured after a fire fight at BS396294, Quang Ngai Province, stated that the VC had moved away since the Mohawk had been operating in the area of his village.

(2) On two occasions, harassing fire against a train ceased when a Mohawk appeared over the incident location.

f. Increase of RVNAF response and effectiveness.

(1) 23d SWAD operations increased the response and effectiveness of supported units by enabling commanders to develop a vast amount of intelligence information not otherwise obtainable and to confirm intelligence obtained from other sources.

(2) The effectiveness of artillery has been substantially increased (see Tab A-1). In Quang Ngai Province from 1 August 1962 to 15 February 1963, only 21% of all artillery fire missions were observed. During the period 15 February to 15 March 1963, 59% of all fire missions were observed, 46% by ARVN observers in Mohawks and 13% by observers on the ground and in liaison-type aircraft. During the same one-month period, VC casualties resulting from artillery fire adjusted by the Mohawk and defensive fires delivered by the 23d SWAD exceeded those inflicted by all other military forces operating in the Province (see Tab A-3a). The point here is not that artillery fire can be adjusted from Mohawks (this can be done from cheaper aircraft), but that the Mohawk crews were able to find and identify suitable targets and then bring artillery fire to bear.

(3) The continuous and immediate availability of the direct support flight team developed air-mindedness in the ARVN commanders and staffs. The divisions developed improved air-ground control and communications procedures which included direct communication between subordinate units of the division and the aircraft crews (see Tab A-3).

3. (C) FINDINGS.

a. Although VC incidents decreased in frequency and intensity in areas in which the 23d SWAD operated continuously, the specific contribution of Mohawks to the trend could not be quantified.

b. Aerial surveillance by the 23d SWAD inhibited VC movement and aggressive activity.

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TAB II

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Final Test Report -- Mohawk

SECTION II -- Objective 1 (Area surveillance)

c. 23d SWAD operations contributed to increased RVNAF response and effectiveness by:

(1) [illegible]tion of intelligence responsive to the requirements of supported units.

(2) Providing the means for rapid application of observed artillery fire on identified targets of opportunity.

(3) Assisting in the development of procedures for command and control of direct support [illegible]ation and in developing air/artillery teams.

4. (C) CONCLUSION.

Continuous surveillance and reconnaissance support by the 23d SWAD was highly effective, and substantially increased the counter-insurgency capability of the supported units.

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TAB II

ACTIV-AM
Final Test Report — Mohawk

SECTION III — Objective 2 (Suitability of the aircraft)

1. (C) OBJECTIVE. (Suitability of Mohawk for Surveillance)

"To determine the suitability and feasibility of OV-1 aircraft for tactical area surveillance."

2. (C) DISCUSSION.

a. Capability of Mohawk to Fulfill Visual Observation and Photographic Requirements. For air-to-ground visual observation, the Mohawk is superior to single-engine, low-wing aircraft. The placement of its twin engines in the wings makes for excellent visibility from the crew compartment. Its blunt nose and bulging side windows give the pilot and observer panoramic visual coverage of the terrain over which they fly. Their fields of view converge only 50 feet below the fuselage.

Of the missions assigned to the 23d SMAD, 77 percent called for visual observation. Another 20 percent were photographic missions on which visual observation took place concurrently. This preponderance of visual observation missions indicates that the human eye is still the only sensor that can detect and identify fleeting targets quickly enough for countermeasures to be applied.

The KS-61 camera system, which is an integral part of the aircraft, can take 240 frames of day photographs or 104 frames of night photographs per sortie. The system proved to be adequate for most large-scale, point, strip, and limited-area photography required by the commander for immediate tactical use. It is neither designed for nor suitable for large-area mapping-type photography.

The importance of a responsive photographic capability in aircraft employed at division level is attested to in reports from field commanders and advisors. (See Annex A.) Perhaps the best evidence of the value of an integrated photographic system, however, can be deduced from the record: targets of opportunity were photographed on 74 visual observation missions. The photographs thus acquired were among the most valuable taken during the test period. All sample photographs in Section III are of targets of opportunity.

The KS-61 system camera can be remotely controlled by the crew to take photographs from five positions (vertical, 15 degrees right or left, and 30 degrees right or left.) The camera cannot, however, take forward oblique shots. It would be desirable for the system to have that capability for missions such as strip photography of helicopter approach routes to landing zones. The desired characteristics for a forward-looking camera system are outlined in Paragraph c5 of this section.

b. Factors Contributing to Mission Success

(1) Air-to-Ground Visibility

This is the one overriding "must" feature for mission accomplishment. As pointed out in Paragraph 2a, above, the Mohawk design permits excellent visibility from the crew compartment.

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SECTION III — Objective 2 (continued)

(2) Speed Range

The speed range of the Mohawk (over 200 to less than 100 knots) meets the requirements of both a quick dash to the target area and slow speed search once in the target area.

(3) Maneuverability

Mohawk maneuverability (turning radius and allowable "G" loads) permits low-level search over broken, compartmented terrain.

(4) Aircraft Noise

The Mohawk is fast enough and quiet enough to have often surprised insurgents and permitted observation and identification of them before they were alerted by the noise of the aircraft. This characteristic contributed greatly to the Mohawk's effectiveness as it did not give the insurgents sufficient time in which to react.

(5) Endurance

The endurance of the Mohawk (over four hours with external tanks) was sufficient for the missions flown during the test period. However, Mohawk crews reported a rapid decrease in their efficiency at surveillance after about 2½ hours of continuous search. Consequently the average Mohawk sortie was just short of two hours; Only 10 percent of the sorties were longer than 2½ hours.

(6) Survivability

Most Mohawk missions in support of II Corps required flight at less than 1500 feet. (See Section IIID.) This altitude is within the kill range of small arms fire from the ground. VC fire was directed at the aircraft 36 times during the test period, and nine aircraft were hit. (See Annex B.) One Mohawk and crew failed to return from a visual observation mission on 10 January 1963. On 9 March 1963 a Mohawk crashed in territory not under GVN control in Quang Ngai Province. The causes of these incidents are unknown. During the five-month test period, the 23d SWAD flew over 2000 hours while performing 778 combat support missions, many of which were analogous to the role of the lead scout of an infantry patrol.

Design features of the aircraft that enhance survivability are:

(a) Twin engine reliability.

(b) Armor protection. (See Paragraph o6 of this section for a detailed description of armor protection together with a recommended improvement.)

(c) Zero-altitude ejection seats with integral survival pack.

(d) Duplicate, widely-separated control cables running

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TAB III

SECTION III — Objective 2 (continued)

through the fuselage to the tail section.

(e) Self-sealing fuel tanks.

(7) Armament

The Mohawk can carry 4000 pounds of conventional aircraft ordnance. Rockets, fragmentation bombs, napalm, etc. can be employed by Mohawk, but during the test period machine guns constituted the only armament. The machine guns were capable, however, of insuring completion of low-level reconnaissance missions by suppressing hostile fire. If the aircraft had not had this capability, two courses of action would have been open: accept the risk of unopposed insurgent fire or abort the mission. Both courses are considered unacceptable.

(8) Communications

Supporting aircraft must be integrated into ground tactical radio nets if they are to be responsive to the ground commander. In counter-insurgency this means communication with back-pack FM radios carried by ground troops. UHF and VHF radios are also needed for air-to-air tactical use, and air-to-ground air traffic control. Mohawk radio equipment meets all of these requirements.

(9) FM Homing

Mohawk equipment includes an AN/ARA-31, which permits the pilot to home on any tactical FM radio. This capability was used for locating friendly units and for finding target areas for night flare drops.

(10) Ability to Live in the Field

The Mohawk was designed to permit operations from short, unimproved fields. However, this ability was not fully tested. The division airstrips, from which Mohawk flights were generally launched, had been prepared to meet the requirements for air line of communication and strike aircraft. They were more than adequate for Mohawk use.

The average availability of Mohawks was 79 percent; over two-thirds of the down time was caused by a shortage of parts (EDP). Four aircraft flew combat support missions every day of one of the monthly reporting periods, averaging 110 hours each for those periods. The Mohawk was relatively easily maintained even though flight teams were decentralized. See table, Mohawk Utilization Statistics at Appendix 2, Annex B.

(11) Versatility

Under normal daylight conditions, the US/ARVN crew could communicate with any aircraft or any FM ground radio in either English or Vietnamese; it could make visual observations; the camera could take 240 frames of vertical or oblique photographs; the Mohawk could home on any FM radio, loiter for a sortie endurance of approximately 4 hours, and could carry conventional ordnance up to a total externally stored load of 4000 pounds. Mohawk night capabilities include flare drop and photography.

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TAB III

SECTION III -- Objective 2 (continued)

Although the Mohawk's strike mission capability was not tested, it is worth noting--for possible use in another theater or in another political context--that the aircraft can perform that function. The variety of Mohawk armament offers suitable ordnance for the great bulk of counter-insurgency targets, most of which are "soft." The tactical advantage of a system that is good at finding a target, and then able to strike it, is pointed out by a Corps senior advisor, in a letter in Appendix 1, Annex A.

c. Suggested Modifications and Development Items for the Mohawk Aircraft

The following modifications and development items for the Mohawk are proposed on the basis of the five-month test experience:

(1) Recording Device

During observation flight it is important that visual contact with targets be maintained as continuously as possible. The recording of observations is currently done with pencil and paper. If a recording device were integrated into the voice radio and intercommunications systems, the aircraft could record verbal descriptions of activity sighted. This would improve the accuracy and detail of observations and increase time available for observations. Simple playback would facilitate debriefing. The recording device should:

(a) Operate from the aircraft power supply.

(b) Be lightweight and compact, perhaps transistorised.

(c) Use tape or wire recorder. (The advantage of tape is that machines for playback are readily available in ground units.)

(d) Be activated by the radio transmit and ICS switches of both crew members, with immediate start and stop.

(e) Be a portable, package replacement.

(f) Have a recording time of 30 minutes.

(g) Have an in-flight play-back feature.

(2) Message Drop Port

Frequently, because of a lack of radio contact or the imposition of radio silence, the only means of contacting ground elements or patrols is by message drop. The Mohawk does not currently provide for this. However, by a minor modification a drop port could be installed in the cockpit floor. The drop port would also permit rapid delivery of photographic prints to advance elements or outposts. The message drop port should:

(a) Have a minimum port diameter of five inches to accommodate 4½ x 4½-inch photo prints and standard message drop containers.

(b) Be capable of operation by either crew member.

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TAB III

SECTION III — Objection 2 (continued)

(3) Multiple Rack or Container for Aerial Illuminating Flares

At present the Mohawk can carry only six illuminating flares—one at each external stores station. With the three-minute flare burnout time, this provides only 18 minutes of continuous illumination. In order to extend the continuous illumination capability, multiple racks or containers are required to mount approximately six flares at each stores station. The flares weigh about 30 pounds each and are slightly less than six inches in diameter. The flare container or rack should:

(a) Be compatible with the Aero 15C and Aero 65A bomb racks.

(b) Have a selector switch to permit dropping flares individually.

(4) Pod-Mounted Loudspeaker System

A detachable loudspeaker system would have many counter-insurgent applications including psychological warfare; instructions or warnings to villagers, outposts, or tribesmen; and search and rescue instructions. The loudspeaker system should:

(a) Operate from the aircraft power source.

(b) Provide for microphone or tape input.

(c) Be mounted in a streamlined, detachable pod for use on an external stores rack.

(d) Have sufficient power and fidelity to be clearly understood while the aircraft is circling at 2000 feet at an airspeed of 150 knots.

(5) Nose-Mounted, Forward-Looking Camera System

The presently-installed KS-61 camera system is not capable of forward oblique photography. Photographs of this type are especially valuable in selecting helicopter landing sites. A nose-mounted system is required to provide 15 or 30 degree forward oblique photography. It should be remotely controlled from the cockpit.

(6) More Powerful Engines

The gross weight of the Mohawk in the configuration used in most of missions during the test was 15,600 pounds. This weight, together with the drag of external stores and hot-weather operations, at times impaired the performance capability of the aircraft. Replacement of the present T53-L-3 engines (960 hp) with the T53-L-7 engines (1100 hp) would provide improved, and safer, performance.

(7) Armor or Flak Suppression Material Along Flanks of Cockpit

During the test period, nine Mohawks received 11 hits by small arms fire from VC forces. A chronological description and charts of

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TAB III

SECTION III — Objective 2 (continued)

locations of the hits are shown in Annex B. Three of the hits were in the cockpit area and resulted in one pilot's being wounded in the left leg and one observer's being wounded in the right leg.

The present JOV-1C armed Mohawk has armor protection consisting of a flak curtain across the nose, a flak curtain on the bulkhead behind both seats, armor plate beneath both seats, and bullet-resistant windshields.

It is likely that both crew injuries could have been prevented had flak curtains been installed along both sides of the cockpit from the floor up to the bottom of the entrance hatch. This is little or no protection to the pilot or observer if rounds penetrate the cockpit area through the plexiglass entrance hatches.

A request (Equipment Improvement Report) for flak curtains has been submitted by the 23d SMAD. As an interim protective measure, salvage flak vests are being used to line both sides of the cockpit area. This will reduce the chances of rounds entering the cockpit area through the fuselage. However, the left and right entrance hatches still remain vulnerable areas.

(8) Infra-red Sensors

Target acquisition capabilities of the Mohawk could be enhanced by addition of infra-red sensors and necessary navigational aids for precise target location. Sensors should be capable of reaction to heat sources located under jungle canopy as well as those in the open.

3. (C) FINDINGS

a. The design features and performance range of the Mohawk are excellent for visual observation—the primary reconnaissance mission in counter-insurgency operations.

b. The Mohawk photographic capability is suited to the requirements for tactical photography of point, strip, and limited area targets (except for forward-looking obliques), and is particularly valuable for acquiring targets of opportunity.

c. An armament capability is required to insure successful mission accomplishment in combat situations.

d. The Mohawk is a highly versatile aircraft. Modifications and developments have been suggested to further increase its versatility and capability.

e. Although not tested, the advantages of a combination reconnaissance and strike aircraft in counter-insurgency situations should be noted.

4. CONCLUSION

The versatile Mohawk is well suited to the accomplishment of the full range of counter-insurgency reconnaissance, except for large area and forward-looking oblique photographs.

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TAB III

ACTIV-AM
Final Test Report -- Mohawk

SECTION IV -- Objective 3 (Activities detected visually and photographically)

1. (C) OBJECTIVE.

"To determine the nature of insurgent activities which can be detected by visual and photographic means."

2. (C) DISCUSSION.

a. Activities detected visually.

(1) Visual observations were made by Mohawk crews on all of their daylight combat support missions. Insurgent locations and activities in the following general categories were observed frequently:

(a) Personnel -- armed bands of VC numbering from two to 100, with various combinations of uniforms, weapons, and accoutrements.

(b) Installations -- huts, watchtowers, caves, storehouses.

(c) Fortifications -- Trenches, bunkers, emplacements, foxholes, palisades.

(d) Obstacles -- anti-helicopter stakes, bent railroad rails, ditches across roads, abatis.

(e) Communications facilities -- rope and vine bridges, ferry cables, trails.

(f) Agriculture -- cultivated fields, grain storage sites, water storage holes.

(g) Domestic animals -- elephants, water buffalo, cattle, dogs.

(2) Intelligence reports developed through 23d SWAD operations in Quang Ngai Province are contained in the intelligence summary extracts attached as Appendix A.

b. Activities detected from photographs.

(1) Mohawk crews accomplished photography of two types:

(a) Directed target-area coverage.

1. Of the 250 photo-reconnaissance missions flown during the test period, 176 were in this category.

2. This type of coverage was particularly valuable for gathering intelligence on permanent or semi-permanent enemy installations -- known or suspected -- such as structures and fortifications.

3. This category also included missions calling for photography of potential landing zones for helicopter operations.

SECTION IV -- Objective 3 (continued)

(b) Target-of-opportunity shots.

1. Targets of opportunity were photographed on 74 occasions.

2. It was found that the longer a Mohawk crew operated with an ARVN division, the greater was the proportion of target-of-opportunity shots. Once an area of interest was given basic photo coverage, and once the Mohawk crew was familiar with the area, spot photography usually was all that was needed to keep the intelligence picture up to date.

(3) In both categories of photography, interpretation of photos often revealed valuable information or details that were not observed visually by the aircraft crews.

(4) Three photographs taken by Mohawk cameras are attached (at Appendix B).

3. (C) FINDINGS.

a. By means of visual reconnaissance, Mohawk crews detected and identified a wide variety of insurgent activities.

b. The Mohawk camera system successfully photographed many types of insurgent activities and installations.

c. Mohawk crews provided supported divisions with a valuable means of obtaining intelligence not otherwise available.

4. (C) CONCLUSION.

Mohawk aircraft, which are capable of providing a means for visual and photographic detection of a wide range of insurgent activities, furnish supported commanders a prime instrument for gathering intelligence.

5. (C) ATTACHMENTS.

Appendix A -- Intelligence summary extracts.

Appendix B -- Photographs.

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TAB IV

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Final Test Report — Mohawk

Appendix A to SECTION IV — Intelligence summary extracts

The following items were extracted from intelligence summaries published by the senior US advisor to the 25th Division during the period from 19 February to 15 March 1963. Many of the items include the G2 Advisor's estimate of the reliability and accuracy of the information; such estimates are given in terms of the following letter-number symbols:

Reliability of source	Evaluation of accuracy
A - completely reliable	1 - confirmed (by other sources)
B - usually reliable	2 - probably true
C - fairly reliable	3 - possibly true
D - usually not reliable	4 - doubtfully true
E - unreliable	5 - probably untrue
F - reliability cannot be judged	6 - truth cannot be judged

1. 191350H (SON HA Border)(US Pilot) Mohawk recce flt fired on by unk wpn vic BS 206372. Pilot did not see wpn but heard loud blast that sounded like firing of a 57mm RR.

2. 201450H (MINH LONG)(US Pilots) 2 Mohawk acft on msn in sprt of tac opn fired on by AW manned by a crew of at least 3 VC vic BS 302477. 1 Mohawk returned fire. VC abandoned gun, escaped into trees. Mohawk fired into trees. Results unk.

3. 21 Feb (TRA BONG, SON TINH) (US Pilots) 2 Mohawk obs fol: 4 VC working rice field vic BS 412812; 18 VC; 10 water buffaloes and 15 cows (moving west on trail vic BS 412794); 20-30 VC running E and W along trail fr tgt area; 1 well-camouflaged struc vic BS 403820. Mohawk adjusted arty; VC losses: est 8-10 KIA.

4. 211515 (CHUONG DUONG)(US Pilots) VC base obs vic BS 110270. In valley area approx 2 km in radius the fol was obsd: est 20 large barracks-type strus in grps of 2-4, 2 wpns pits which appear to be for AA MG (possibly 12.7 mm MG - no wpns obsd, est 12 pers, several water buffaloes, est 12 hectares (30 acres) rice fields, 4-5 potential LZ's, many trails leading into 4 or 5 main trails into the valley (trails est 1.5-3. km in width). Strus were described as "not new, some quite old". Cmt 25 Div G2 Adv: Tends to confirm verbal rpt passed to Div Adv by II Corps CO indicating that Rq 2d Rgt had move fr vic BS 1447 to vic BS 205390. Rq 2d Rgt previously rpted to have 2 12.7mm MG, types unspecified. Usually based w/Rq 2d Rgt is the Q300 Hvy Wpns Bn also rpted to have 2 12.7mm MG. Pers tend to confirm possession of at least 2 12.7mm MG by 2d Rgt plus Q300 Hvy Wpns Bn. Age of struc and apparent dearth of pers indicates this may be an alternate base area manned by only a caretaker force. Photo coverage is incomplete because acft were called off msn to obs mad ovac in sprt of tac opn.

5. 211630H (MO DUC, BA TO)(US Pilots) 2 Mohawk acft, on obs msn for mad ovac in sprt of tac opn, drew SA fire fr 2 VC vic BS 645461. Mohawk returned fire and appeared to hit both VC.

6. 221630H (SON HA)(US Pilots) Mohawk acft on recce msn received SA fire fr unk nr VC in 2 pers vic BS 429658. Acft returned fire but depth of 1 wpn pos prevented effective fire. Results: unk, believed neg.

7. 231900H (MINH LONG, BA TO)(US Pilots) Mohawk acft, on obs msn, revd

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Final Test Report — Mohawk

Appendix A to SECTION IV (continued)

SA fire from 3 VC shooting fr under elevated struc vic BS 502425. Acft returned fire. VC dispersed. 2 dressed in black peasant garb, 1 in yellow shirt. Cmt 25 Div G2 Adv: Yellow shirts have been rptd worn by regular units. May be members of Q95 Bn operating in this area.

8. Ref: para II,A. (9 below). Results of air adj arty strike, 251700H. Est 3 VC KIA, 4 struc dest.

9. 251700H (SON HA)(US Pilots) Ref: ISUM NR 56 para II, F. Mohawk acft on air recce msn obs fol: 1.) 15 puptent-shaped grass struc hidden under elephant grass and trees vic BS 422298. (2.) In a valley 2x3 km vic BS 407300: est 200 very small foxholes over entire valley floor and slopes; est 30 struc scattered along stream down length of valley; est 100 persons in area. (3) 8-9 well hidden struc vic BS 405297. (4) 8 struc vic BS 401308. (5) Est 20 struc vic BS 440352. (6) 80-90 struc fr BS 475335 to BS 445390. (7) Est 15 holes tunneled into hills vic BS 440369. Cmt 25 Div G2 Adv: Init rpt of "puptent" struc and of small foxholes. Arty called. See par VI,A, (8 above)

10. 22 Feb (Defector F/6) Ref: ISUM 55, para VIB. Def rpts fol: (1) 299 Lcl Co now aka C/212 Co. (2) Opn C/212 Co: 2 plt, total str 92 (50% now [redacted]). (3) Wpns: 1 pistol, 3 AR, 14 MAT 49, 64 rifles (MAS 36 and US 17). Ea MAS 36 has 20-60 rds, ea SMG has 150 rds. (4) Co often hides vic BS 5239. (5) Morale low as result of air strikes and air adjusted arty. Div Cmt: Believed to aka 86 Lcl Co.

11. SOMTIMH 271100H Arty dest 3-4 struc vic BS 410813 and 1 struc vic BS 417806.

12. BA TO 271040H Mohawk acft obs 75 VC single file on trail vic BS 654287 moving E, w/back packs and indiv wpns, basket helmets, black or light blue shorts, black shorts. VC fired on acft who returned fire. Results: 10 KIA by acft MG, est 50 VC by arty. Div Adv Cmt: Light blue shirts indicative of 50 Bn.

13. SCN HA 271900H Mohawk acft obs 30 VC in single file on trail vic BS 398294, 5 w/rifles, 5 w/porter poles. VC fired SA. Acft returned fire and adjusted 4.2 mort fire. Results: 5 VC KIA by acft. Cas by mort unk.

14. BA TO 271900H_ VC fired SA at Mohawks, Acft returned fire and adjusted arty. Results: 3 struc dest BS 671295, 7 cas obs BS 663298, 12 cas obs BS 671296. Total cas unkn.

15. 28110H (US Pilots B/2) (a) 20-30 VC obs vic BS 714209, w/light khaki and a few black uniforms, indiv wpns for all pers, helmets (description fits PAVN-type steel helmet). Well trained trps "froze" in place until acft was out of sight then took cover.

(b) Mohawks also obs fol: 10 foxholes BS 714205, 15 foxholes BS716217, several holes 4-5 ft tunneled into side of ridge fr BS 635300 to BS 7030, 2 struc vic BS 674295.

16. AIR AND NAVAL ACTIVITIES: a. 271045H (SON HA) Mohawk pilot heard 2 explosions fr ground which sounded like 57mm RR or sim wpn. No bursts obs or dam to acft. Vic BS 274695. Acft alt 800 ft above valley floor. High ground in vic approx 750 ft above valley floor.

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TAB IV-A

AOI [illegible]
Flt Ops Post Report -- Mohawk

Appendix [illegible] OPERATION SAY (continued)

17. [illegible] 1. 0620H (US Pilots B/2) Mohawk acft obs 50 VC. Fortified pgmt surrounding 1 struc, 4 to 6 ha (hectares) rice fields, bamboo spike fence w/mort [illegible] BS 430441. VC dressed in black unif, bank t helmets. No wpns obs. 4.2 in mort fired, Results unk, believed negligible.

18. PA TO 1. 071745H Mohawk acft hit by low velocity, single rd over BS 663477. No msg dmg to acft. No cas.
2. 030625H Mohawk acft received ground fire fr loc 6742. 1 rd cal 30 struck acft in left side and produced frag penetration in cockpit which hit pilot in left thigh. Acft alt 500 ft, air speed 170 knots. Cas 1 KIA (US Pilot).

19. BA TO 02 Mar (US Pilots) Mohawk acft obs fol:
1. 021425H [illegible]5 VC vic BS 650320. Acft fired def fire and adj arty. Results: 5 VC prob KIA by acft plus est 15 cas fr arty.
2. 021430H [illegible] VC moving E along trail vic BS638398. Acft fired def fire. 7 VC prob KIA, est 5 more KIA.
3. 021725H [illegible] VC in holes, 30-50 in foliage. Acft fired def fire. 5 VC prob KIA.
4. VC dressed in black w/shorts or w/no trousers.

20. 03 Mar (B/2) Mohawk observed 1 VC, w/rifle camouflaged helmet and light blue shirt vic BS 600320. Div Adv Cmd: Probably elem of 50th Bn, usually operating in this area.

21. 041510H (US Pilots B/2)Mohawk acft obs 5 struc, 10 VC w/wpns, black unif w/short trousers.

22. 04 Mar (US Pilots B/2) Mohawk acft obs 5 struc vic BS 437350. No pers obs.

23. 04 Mar (US Pilots B/2) 15 to 25 ha rice fields within 2-4 km radius of BS [illegible]0315.

24. 04 [illegible] Mohawk obs 10 VC vic BS 663477. VC dispersed into foliage.

25. PA TO 01-03 Mar (US Mohaw Pilots B/2) Rpt heli LZ BS 684308 has been implanted w/anti heli stakes 2-3 meters high, within last 14 days.

26. [illegible] 0609[illegible] Mar (US Pilots B/2): VC fired on Mohawk vic BS 810272. Mohawk received one hit on left wing, probably .30 cal.

27. DUC PHO 051745H Mar (US Pilots B/2). BS 815260 est plat VC (about 15 personnel) fired on Mohawk. Acft fired def fire and adj arty. Losses: En KIA from def fire. 10 est by arty.

28. TRA DUC 051615H Mar (US Pilots B/2) 1. Mohawk fired on by VC small arms fire BS 410840. No damage.

[illegible] 060100H Mar (US Pilots B/2). Mohawk fired upon by 1 unit (approx 200 VC) vic BS 638649. Delivered def fire. KIA 6 (observed).

30. 061345H Mar (BA TO [illegible] Pilots B/2) Approx 30 foxholes including auto wpns positions vic BS 727[illegible], all clearings for several km appear filled w/anti heli stakes. Observed [illegible] 7 [illegible]4 more foxholes some areas much activity.

Appendix A to SECTION IV (continued)

31. 061345H Mar (BA TO)(US Pilots B/2) New structures appearing vic BS 745326, since last opn. 2 VC in blue uniforms and gun metal or mahogany colored helmets. Arty called in. Losses En: 2 VC KIA, 4 structures destroyed. Fr. None.

32. 070730H Mar (TRA BONG) (US Pilots B/2). 10 pillboxes made of bamboo about 2 ft high and camouflaged w/fields of fire cut overlooking the valley. Also 10 structures resembling a rice storage bin (in dug out with thatch roof about 2 ft above ground level.) 15 living structures and one large structure about 100X15 ft. No personnel were observed in the area. Arty was called in but was out of range. ARVN units enroute to that location now.

33. 071145H Mar (DUC PHO)(US Pilots B/2) Mohawk observed approx 30 VC vic BS 802230 dressed in black except for one who was dressed in blue. One woman also observed (in green).

34. 071155H Mar (BA TO(US Pilots B/2) Mohawk observed 1 plat VC vic BS 789283. VC ran across fld and into woods. Reported it as possible arty target.

35. 071115H Mar (US Pilots B/2). Mohawk fired upon by unk nr of wpns. (believed to be AR's) vic BS 810220. Returned def fire. Losses En. est 1 KIA.

36. 071130H Mar (US Pilots B/2) approx 6 VC fired on Mohawk vic BS 803190. Mohawk fired def fire. Est 3 VC cas.

37. 080950H Mar 63 (BA TO)(US Pilots B/2) In response to defectors' report of VC, harvesting rice vic BS 657378, Mohawks obs 12 VC working in field. They froze in their tracks and flopped down in furrows when plane flew over. Mohawk adj arty, results unk.

38. 081045H Mar 63 (BA TO)(US Pilots B/2) Mohawks received hostile fire from 4 VC vic BS 734323. Reported to arty who fired losses unk.

39. 081605H Mar 63 (DU PHO)(US Pilots B/2) Approx 10 VC fired on Mohawk vic BS 822270. Mohawks fired def fire. Losses unk (Believed no damage.)

40. 121000H Mar 63 (SON HA)(US Pilots B/2) Mohawk pilots sighted bridge approx 3 ft wide vic BS 112582 well used trail leading up to it.

41. 131545 Mar 63. (SON HA)(US Pilots B/2) Mohawk and Helicopter fired on by VC vic BS 142445, delivered def fire, Results unk.

42. 131550 Mar 63. (SON HA)(US Pilots B/2). Mohawk fired on by VC BS 130473, delivered def fire. Results unk.

43. 131440 Mar 63 (SON HA)(US Pilots B/2) Mohawk obs 150 to 200 VC in valley vic BS 410795 to BS 452802, adj arty fire. Losses: En 5 KIA observed (estimate many more).

44. 131440 Mar 63 (SON HA) (US Pilots B/2) Mohawk fired on by 10 VC with AW, delivered def fire. Losses. En unk.

45. 131730 Mar 63 (SON HA)(US Pilots B/2). Mohawk obs approx 12 VC with

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Appendix A to SECTION IV (continued)

what appeared to be litter at BS 362789, also houses vic BS 360789. Div Adv Cmt: Tends to confirm previous rpt of VC hospital in this vic.

46. 140930 Mar 63 (DUC PHO)(ARVN C/4) 8 VC captured vic BS 776351. Claimed they hid their wpns and moved to these coord to escape from arty and Mohawks.

47. 141120 Mar 63 (BA TO)(US Pilots B/2). Mohawk obs 6 VC structures under trees at BS 384398, and 5 at BS 379508. Arty fired to good effect, no direct hits. Cas unk.

48. 140735 Mar 63 (DUC PHO)(US Pilots B/2) Mohawk obs est one VC plt at BS 775355.

49. 140750 Mar 63 (DUC PHO)(US Pilots B/2). Mohawk obs approx 20 porters, mostly women with approx 25 VC armed w/shoulder wpns, at BS 862258.

50. 140900 Mar 63 (BA TO)(US Pilots B/2) Mohawk directed arty fire on est VC plt at BS 765352. Results. Unknown. Mohawk Cmt. Rin Tin Tin intercepted VC radio message. Warning plt that aircraft was approaching and to take cover under trees.

51. 131620 Mar 63 (TRA BONG-SON TIME)(ARVN C/3). Action of 2d Bn/51 supported by Mohawk engaged approx one Co VC (est by ARVN)(5 obs by US pilots) at BS 426802. Losses: En. 7 KIA. Friendly: 4 WIA.

52. 151200 Mar 63 (BA TO)(US Pilots B/2) (BINH LONH Valley). New structures going up throughout the valley vic BS 552400. VC fired on Mohawk acft w/small arms, vic BS 568395. Mohawks delivered def fires. Results: Unk

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Appendix B to SECTION IV — Photographs

This appendix consists of the following photographs:

Photo 1 — This target-of-opportunity shot shows a typical attempt by members of the VC to avoid detection by the Mohawks. It also demonstrates the ability of the Mohawk to surprise insurgents and locate them in the open.

Photo 2 — A VC suspension bridge at Ba To (BS 570340) is pictured. It is evident that such a bridge would be detectable only from very low altitudes. This bridge was later destroyed by the VC.

Photo 3 — This layout (at BS 380330) was believed to be a VC training facility for anti-aircraft instruction. The arrow at top left may be a training aid for teaching the amount of lead required to hit an aircraft with small arms or automatic weapons fire. The aircraft mock-ups apparently were intended to resemble the Mohawk.

Photos 2 and 3 are examples of permanently-recorded information which, when subjected to photo-interpretation and correlated with other information, might make a substantial contribution to an overall intelligence estimate.

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SECTION V -- Objective 4 (Doctrine, procedures, tactics and techniques)

1. (C) OBJECTIVE.

"To determine the adequacy and validity of current US Army doctrine, tactics, and techniques for employment of OV-1 type aircraft in a tactical area surveillance role and to further develop doctrine, procedures, tactics, and techniques for counter-insurgency operations."

2. (C) DISCUSSION.

a. Doctrine.

Guidelines for the employment of the 23d SWAD during this test were derived from the following doctrinal statements which are taken from the final manuscript draft version of Army Field Manual 1-100:

> Army aviation is employed to augment the capability of the Army to conduct prompt and sustained combat incident to operations on land. Like other support activities, Army aviation units are organic to tactical and administrative units when habitual use and unit mission so dictate. It is used by the force commander as he considers necessary for the accomplishment of his mission. Army aviation units, regardless of size or composition, must be employed in a manner that will allow decentralized execution of functions. Support elements of aviation units must be capable of operating for, and with, supported units. Army aviation support must be intergrated into, and based upon, the fire support plan and scheme of maneuver of the supported unit. Economy of use is realized by assigning specific aviation units and/or aircraft to perform missions which they are best capable of performing and by scheduling aircraft to assure their maximum continual use. Direct support provides for a direct mission request channel between units involved.

b. Doctrinal implementation.

Described below under the headings: Control procedures, surveillance techniques, tactics, and flight-following procedures, are actions during the test period which give substance to the doctrinal concepts expressed above.

(1) Control procedures.

Although procedures for control and direction of supporting elements of the 23d SAD varied among units, all were compatible with current Army doctrinal concepts. The following procedures were used in the 25th ARVN Division. They illustrate the essential control measures required to insure intergrated and responsive Mohawk support:

(a) Space was provided for the flight team duty officer and a ground-mounted AN/VRC-18 (FM) radio equipped with an RC-292 antenna in the US advisors' operations center. The AN/VRC-18, the AN/ARC-44 radios in the OV-1 aircraft, and a vehicular-mounted AN/VRC-10 (FM) radio at the adjacent airstrip were used to control airborne aircraft and to pass information from the operations center to the crews at the airstrip. This Mohawk control net was listed in the Division SOI.

(b) In coordination with his ARVN counterpart and the G-3, the G-2 advisor determined the specific missions to be flown and assigned them to the

SECTION V — Objective 4 (continued)

flight team leader or flight team duty officer, using the standard mission request format. G2 and G3 advisors briefed or debriefed US pilots; ARVN division staff officers briefed and debriefed the ARVN observers.

(c) US pilots and ARVN observers carried an abbreviated SOI containing call signs and frequencies of ARVN units. Frequently, they were directed to obtain observation instructions from a particular infantry or artillery unit. When contact with a specific unit was not required, the crews monitored the division air-ground FM frequency. It became customary for ground units to establish radio contact when a Mohawk flew in their vicinity. Using this system, many add-on missions received from ground troops, apart from the primary mission assigned by the division advisors, were accomplished by the Mohawks.

(d) Mohawk crews made spot reports to ground units in the immediate vicinity of the observed activity and reported directly to the US advisors' operations center (via the Mohawk control net) information of immediate importance to the division. Crews returning from missions were debriefed. Frequently, in order to follow-up or maintain contact with a located VC unit, debriefing was short and the crews returned as quickly as possible to the same surveillance area. On these occasions time on the ground was limited to refueling and re-arming time: less than 10 minutes.

(e) At night a standby aircraft equipped with flares and a standby crew were designated to enable "scramble" illumination missions to be launched within 15 minutes of receipt of the mission request.

(f) At the end of the day, crews were thoroughly debriefed at the operations center. Normally, between 2000 and 2200 hours, utilizing all intelligence received during the day from all sources, Mohawk crews were briefed on missions to be performed the following morning.

(g) Mission records show that of nearly 30 per cent were assigned to be flown immediately to react to fresh information and an additional 60 percent to be flown within a day to follow up on information. The remaining missions (usually photo missions) were assigned with 24 hours or more lead time.

(2) Surveillance techniques.

A variety of aerial surveillance procedures, tactics, and techniques were field tested during the five-month test period. Procedures which were standardized and used successfully by the 23d SWAD are as follows:

(a) Mission planning. Employment of the Mohawks in a direct support role afforded the pilots the opportunity to become intimately familiar with the tactical zone of the supported ARVN Division. Time-consuming area study before flight was usually unnecessary. Knowledge gained in previous flights was the best source of pre-flight information for missions that followed. When the mission was assigned, crews were briefed on detailed information required and the purpose for which the information was to be used. In this way crews were able to exercise tactical judgment and exploit unforeseen developments.

(b) Initial Entry Into the Search Area. Normally, on a visual observation mission, initial entry into the designated search area was made at 1500 feet above the highest terrain at an airspeed of 140-160 knots. This provided

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almost complete safety from small arms fire and permitted an initial scan of a broad area. The crew scanned a fan-shaped area ahead of the aircraft extending about 45 degrees on either side of the centerline. Movement, groups of personnel, fortifications and emplacements were the priority items sought during the initial penetration.

(c) Detailed Search

1 Personnel Targets. Persons once detected, were investigated immediately. If visual contact was lost, even for seconds, suspects usually disappeared. Relocating such people was always difficult and often unsuccessful. Identity was determined by activity, uniform, weapons, and location. Suspects who committed hostile acts; i.e., fired on the aircraft were assumed to be VC. Presence of armed personnel in areas in which no GVN or friendly forces were operating established a strong presumption that the people were insurgents. This, together with activity such as manning VC fortifications or emplacements, was also considered to be evidence that the suspects were VC. A typical VC tactic in Quang Ngai Province, when insurgents were surprised in the open by a Mohawk, was to freeze until the aircraft had passed, then to run for cover. (This was usually observed by a second Mohawk crew following behind the first.) When activity or identity of the personnel was determined, one or more of the following actions was taken, depending upon the mission assigned:

a Spot reports by radio to a nearby ARVN unit or to the division headquarters.

b Photographs taken.

c When positively identified as VC, the FSCC notified for possible fire missions by artillery or mortars.

d Information recorded by the crew and reported at the post-mission debriefing.

2 Installations. Installations such as structures, fortifications, emplacements, or obstacles were observed thoroughly as soon as detected by a methodical low-level (500 feet) search.

3 Search Patterns. During the initial scan, the aviator completed his plan for the pattern of his low-level detailed search. The search pattern was selected to achieve surprise by techniques such as ridgeline hopping, taking advantage of terrain and wind. This often resulted in locating people in the open. The search pattern was varied in speed, direction, and altitude. When possible aircraft flew parallel to the ridgeline and down-slope toward the open end of the valley. The most likely areas for targets were the ridgeline trails and the valley floor adjacent to wooded slopes.

4 Optimum Altitudes. Altitudes shown below were found to be effective for locating and photographing the subjects listed:

a Visual observation

Subject	Altitude
Troops in open	1500 feet
Troops in Woods or Jungle	500 feet or lower

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Emplacements	1500 feet
Agriculture	500 feet
Artillery Adjustment (after target is located and identified)	2000 feet
Railroad Reconnaissance	50-300 feet

b Photography

Subject	Altitude
Troops in the Open	500 feet
Troops in Woods or Jungle	as low as possible
Helicopter LZ's and Routes	100-500 feet

(3) Tactics.

(a) Annex D, Monthly Report Number 3, contained a discussion of the relative advantages of employing Mohawks singly or in pairs while performing typical counter-insurgency observation and surveillance missions. At that time aircraft crews had observed hostile ground fire only seven times in a total of 442 combat support missions. It was found that under the circumstances then prevailing in the II Corps zone employment of single Mohawk normally was more effective than employing in pairs.

(b) In the final month of the evaluation period, circumstances changed radically. The flight team stationed at Quang Ngai observed ground fire on the Mohawks 26 times in 29 days. Also, reconnaissance missions were conducted deep in territory that had been under firm communist control for twenty years. The risk involved pointed to the use of aircraft working in pairs as the normal practice. Some observations on successful techniques are described below:

1 On initial entry into a search area, the trail aircraft followed at a distance of 500 to 1000 meters at about the same altitude as the lead (search) Mohawk. From this trail position the crew often detected ground fire on the lead aircraft which might not have otherwise been detected. The second aircraft was also in a good position to photograph targets of opportunity and to deliver defensive fire if necessary.

2 Employment in pairs does not imply close formation. In missions calling for a single crew, as in artillery adjustment, the second aircraft normally performed another mission (photography or visual observation) in the same general area. Radio contact was maintained between the two aircraft and they could rejoin in a matter of minutes.

3 Generally, on shallow penetrations, when stealth is essential and known VC automatic weapons emplacements will be avoided, a single aircraft will be most productive.

4 Deep penetrations into known VC base areas from which anti-aircraft fire is frequently received should be performed by a team of two Mohawks.

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SECTION V — Objective 4 (continued)

(4) Flight-following procedures

(a) In order to obtain positive, controlled flight-following, the 23d SOAD established its own flight-following system. FM ground control stations were established in the operations office at Nha Trang, at Qui Nhon, and at Quang Ngai. All stations operated on a common frequency.

(b) Flights were monitored by means of sign-out boards which were maintained at each of the ground control stations. Pilots posted the information on these boards before take-off, or reported to the duty officer by radio immediately after take-off.

(c) For flights between 23d SOAD ground control stations the flight plan was called via the tropo-scatter system to the destination station. On these flights the pilots maintained contact en route with the nearest ground control stations. Any deviation from the flight plan or change in ETA was reported to a ground station. Upon arrival at the destination the pilot closed his flight plan, either by radio or in person at the destination control station. The duty officer then closed the flight by phone at the station from which the flight originated.

(d) On local combat support flights (by far the greatest number) aviators switched to the division air-ground frequency or other tactical net directed for the mission. However, spot reports direct to the division headquarters were frequently reported over the Mohawk control net.

(e) All flights were closely monitored by the operations officer or the duty officer, and a communications search was undertaken if contact was not established or the plane had not landed five minutes after ETA. If contact was not established within 30 minutes, local search operations were started and Search and Rescue, JASC, was alerted through the nearest TACS facility. After one hour had expired a maximum search and rescue effort was ordered.

(f) This system not only provided the Commanding Officer, 23d SOAD with positive knowledge of the location of his aircraft, but was of service to other aircraft as well. The crews of Caribou, Buffalo U-10 Aircraft, and VNAF O-1 aircraft flown by the VNAF pilots frequently used the 23d SOAD control facilities for flight-following and in-flight assistance.

c. Analysis of factors pertaining to tactical effectiveness

(1) Effectiveness. That the 23d SOAD was effective is beyond question. The degree of effectiveness is best stated in the words of the supported unit commanders and senior advisors which are contained in Annex A. The satisfaction of these users is most understandable when their comments are considered in the light of the ISOM concepts shown previously in Section IV. Although some 23d SOAD services overlapped those provided by other aviation units, most were unique in scope or quality. Materiel capabilities, discussed earlier, permitted the Mohawks to perform visual observation far more effectively than liaison aircraft, and permitted reconnaissance of many areas which had not previously been penetrated by effective air observation. Mohawk photography provided continuous and responsive tactical photography which complemented the large area photography capability of Air Force aircraft.

(2) Responsiveness. Supported units frequently described 23d SOAD support as "responsive". Measurements were taken of this response with results as follows:

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SECTION V — Objective 4 (continued)

ARVN divisions assigned 298 missions to their supporting flight teams, exclusive of training and service missions and railway reconnaissance missions scheduled through the 23d SWAD operations officer.

Actions of the 23d SWAD were as follows:

Number of missions assigned	298
Number of missions flown	259
Number of missions not flown	39
Reasons:	
Weather	25
Aborted	2
Aircraft not available	12

The following table shows the time the mission was received, the specific date/time the mission was requested to be flown, and the performance of the flight team in meeting these assignments. The records of 15 missions were not kept in sufficient detail to obtain accurate date/time data.

Time in hours from receipt of mission requests	Number of missions requested to be flown in each time bracket shown in left column	Flown on or prior to time requested	Flown one hour later than requested	Flown more than one hour later than requested
0-1	74 (30%)	62	6	6
2-3	43 (18%)	33	6	4
4-6	15 (6%)	15	0	0
7-12	17 (7%)	15	0	2
13-24	71 (29%)	57	1	13
over 24	24 (10%)	20	1	1
TOTALS	244	202 (83%)	16 (7%)	26 (10%)

NOTE: In nearly one-third of the cases the flight team was asked to fly the missions within an hour of receipt of the request, and in only 10 per cent of the cases was the lead time more than 24 hours.

(3) Usage. Full usage of flight teams in direct support of divisions is evident from the following data:

FLIGHT TEAM AT QUI NHON IN SUPPORT OF THE 9TH DIVISION

Period	Sorties	Flight hours
23 Nov - 15 Dec 62 (23 days)	80	129

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SECTION V — Objective 4 (continued)

16 Dec 62 - 15 Jan 63	78	154
16 Jan 63 - 15 Feb 63	108	208
16 Feb 63 - 15 Mar 63	127	241

FLIGHT TEAM AT QUANG NGAI IN SUPPORT OF 25TH DIVISION

Period	Sorties	Flight hours
15 Feb - 15 Mar 63	167	305

MONTHLY AVERAGE PER DIVISION FLIGHT TEAM (TWO AIRCRAFT)

	117	215

In these operations, the average monthly utilization per aircraft was higher than the US Army mobilization flying hour program for Mohawk aircraft -- 80 flight hours per month in combat areas.

(4) Control and coordination. No separate air command and control system was required for 23d SWAD operations. Additional staff personnel were neither required nor added to any supported unit headquarters to control or coordinate operations of the flight teams. Forward air controllers were not required because of the air-ground teamwork achieved as a result of the direct support assignment, crew familiarity with the tactical situation, and inclusion of the Mohawks in division tactical radio nets.

The focal point for coordination of air space over the division tactical area is the division tactical operations center. This holds true whether the air space user is artillery, Army aviation, or air support provided by other services. No matter how much air coordination is performed at higher echelons the final coordination of the use of division air space cannot be omitted. Coordination of Mohawk operations was successfully accomplished within the TOC, and controlled through procedures described previously in this report. The effectiveness of these control and coordination procedures is shown by the experience of one flight team during the last month of the test:

— Airborne Mohawks were diverted eight times to perform immediate missions of a higher priority.

— Twice when hostile ground fire was directed at the aircraft, defensive fires were not returned because of a radio check disclosed that friendly troops were in the immediate vicinity.

— In all 19 instances in which Mohawk crews returned defensive fires they were in radio contact with ground elements.

3. (C) FINDINGS.

a. 23d SWAD flight teams were fully and continuously used by supported divisions.

b. The 23d SWAD provided the supported divisions with essential reconnaissance and surveillance services which were not duplicated in scope, quality or responsiveness by other means.

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SECTION V — Objective 4 (continued)

c. The supported unit commanders (advisors) effectively controlled, coordinated, and directed the activities of the Mohawk flight teams with no advice from specialist other than that provided by the flight team officers.

d. The procedures and tactics and techniques described herein have proved effective in counter-insurgency operations in the II Corps (ARVN) tactical zone.

4. (C) CONCLUSIONS.

US Army doctrine for the employment of aviation units is sound as it applies to the employment of Mohawk aircraft in support of counter-insurgency operations.

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SECTION VI -- Objective 5 (Adequacy of equipment and personnel)

1. (C) OBJECTIVE.

"To determine the adequacy of equipment and personnel to support tactical area surveillance operations."

2. (C) DISCUSSION.

Significant inadequacies found in the TOE are discussed below and are reflected in the recommended changes to the TOE contained in Annex C.

a. Headquarters Team.

(1) An administrative officer (warrant officer) is required to supervise administration and supply activities. The detachment maintains all personnel records on 110 officers and enlisted men. During a three month period it handled 2100 supply requisitions. Since officers in the flight teams are frequently detached, no officer or warrant officer currently authorized under the TOE is availabl to perform these duties as an additional duty.

(2) An organic utility airplane is required to facilitate liaison and command supervision of detached flight teams, to provide responsive logistics and administrative support for these teams, and to expedite the delivery of photographic prints.

b. Communications Team.

The requirement for an increased photo processing capability was covered in Monthly Report Nr 2.

(1) The unit currently has two photographic darkrooms and personnel to operate them. However, one additional photo laboratory and personnel to operate it are still required.

(2) A more powerful radio is necessary to insure communications with dispersed flight teams. It is recommended that the AN/GRC-26D be added to the TOE for this purpose.

c. Flight Teams.

The use of ARVN observers was discussed in Monthly Report Nr. 3.

(1) At present the ground elements with the flight teams have no organic UHF communications capability. It is desirable that a back-up be provided to the present FM radio communications between the aircraft and the airfield from which they operate.

(2) The flight teams also require additional organic transportation. A ¼-ton truck mounting an AN/VRC-24 radio would satisfy both communications and transportation requirements for each flight team.

d. Maintenance and Service Team - Field Maintenance Team.

Recommended reorganization of these two teams is detailed in

SECTION VI - Objective 5 (continued)

Annex C. The advantages of an organic aircraft field maintenance capability are discussed in Section IV, G2i. The capability of the unit to support four more Mohawk aircraft with the addition of only eighteen enlisted personnel is discussed at Annex E, Monthly Report Number 2.

e. Motor Maintenance Team.

Two engineer equipment repairmen are required to maintain the thirty items of engineer and ground support power equipment.

3. (C) FINDINGS.

a. Inadequacies exist in the TOE of the 23d SWAD in the following areas:

(1) An officer (warrant officer) is needed to full-time supervision of administration (personnel and supply).

(2) One additional photographic laboratory and four photographic laboratory specialist are required.

(3) A utility aircraft is required for command liaison and logistical support of detached flight teams.

(4) Additional radios are required for the communications and flight teams.

(5) Two enlisted engineer equipment repairma are required.

b. More efficient utilization of personnel woul be achieved by combining the maintenance and service team with the field maintenance team.

4. (C) CONCLUSION.

The TOE of the 23d SWAD should be changed to incorpora tl changes contained in Annex C.

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SECTION VII -- Objective 6 (Changes in TOE and Technical Training Literature)

1. (C) OBJECTIVE.

"To recommend necessary changes to the TOE (Modified) training and technical literature released on the results of the operational evaluation."

2. (C) DISCUSSION.

Recommended changes to the 23d SWAD TOE are contained in Annex C and discussed in Section VI, preceding..

a. The primary publication utilized by 23d SWAD aviators and ordnance maintenance personnel for technical and training guidance is the Preliminary Operation and Maintenance Data for AO-1 Armed Mohawk. This manual is prepared and published by Grumman Aircraft Engineering Corporation and is issued with each JOV-1C aircraft. It serves as a supplement to TM 55-1510-204-10 (Operators Manual) and TM 55-1510-204-20 (Organisational Maintenance Manual). Although general in coverage, the manual is adequate for basic operation and routine maintenance of the JOV-1C armament systems. Engineering diagrams of armament systems are included with the manual to show systems configurations.

b. For detailed instructions on individual armament systems and ordnance delivery techniques, additional manuals published by the Navy Bureaus of Weapons, Aeronautics, and Ordnance, are required. Some of these manuals were used as reference materiel for compilation of the Grumman publication and for unit training purposes. A list of Navy manuals which the 23d SWAD found to be useful is contained in Appendix A, Tab VII A.

c. Many parts requisitions for armament system components have been held up in Army supply channels because the only parts numbers available are those listed in Naval publications.

3. (C) FINDINGS.

a. There are no Army publications currently available which provide adequate technical and training guidance for operation and maintenance of Mohawk armament systems.

b. Cross-referencing of parts numbers from Navy publications to Army supply manuals is impossible at the lower echelons of Army supply channels.

4. (C) CONCLUSION.

Army technical and training literature should be developed for Mohawk armament systems.

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Appendix A to Section VII - Naval Publications used by 23d SMAD

NAVWEPS 11-5E-509 dtd 1 Oct 56, revised 1 Aug 60.

Handbook of Operation, Maintenance and Overhaul Instructions with Illustrated Parts Breakdown, Bomb Rack, Model AERO 65A

NAVAER 11-75A-18 dtd 1 Nov 59, revised 1 Mar 61.

Handbook of Operation Maintenance and Overhaul Instructions with Illustrated Parts Breakdown, Bomb Rack and Rocket Launcher Combination, Models AERO 15C and AERO 15C-1

AN 10-10CB-8 dtd 15 Mar 45, revised 16 May 52

Handbook of Operation, Service, and Overhaul Instructions with Parts Catalog. Gun Cameras, types N-6 and AN-N-6

NAVWEPS 11-75A-26 dtd 1 May 61

Handbook for Operation and Maintenance Instructions.
Guided Missile Launcher, Model LAU-7/A

NAVWEPS 11-75A-27 dtd 1 May 61

Handbook of Overhaul Instructions.
Guided Missile Launcher, Model LAU-7/A

NAVWEPS 11-75A-28 dtd 15 Mar 61

Illustrated Parts Breakdown
Missile Launcher, Model LAU-7/A

NAVWEPS 11-5-597 dtd 1 Mar 58

Handbook of Operations and Maintenance Instructions.
Rocket Launcher, Package, Model AERO 7D

NAVAER 11-75A-505 dtd 15 Nov 56

Handbook of Operation and Service Instructions
Missile Launcher and Pylon Assemblies, Model AERO3A

NAVAER 11-75A-506 dtd 15 Nov 56

Illustrated Parts Breakdown
Missile Launcher and Pylon Assemblies, Model AERO3A

NAVWEPS 11-75A-20 dtd 1 May 60

Handbook of Operation and Service Instructions.
Rocket Launcher, Model LAU-10/A

NAVWEPS 11-5-578 dtd 15 Mar 62

Handbook of Operation and Service Instructions.
Aircraft Rocket Launcher Package, Model AERO6A-2

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NAVAER 11-70GDC-501 dtd 23 Apr 53

Description, Operation, Installation, and Maintenance
Illuminated Sight, Mark 20, Model 0 and 4

NAVAER 11-70GDC-502 dtd 14 Jan 53

Overhaul and Parts Catalog
Illuminated Sight, Mark 20, Models 0 and 4

OP1793 dtd 14 Sep 54

Description and Instructions for Use
2.75" Folding Fin Aircraft Rocket

NAVWEPS 00-80T-8 dtd 4 May 61

Naval Air Training and Operating Procedures Standardization Manual, AD6/7

Firing Tables, Air to Ground for -
50 cal machine guns
2.75 in. Aircraft rockets
250-1000 lb bombs
etc

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SECTION VIII - Objective 7 (Logistics problems)

1. (C) OBJECTIVE.

"To determine logistical problems."

2. (C) DISCUSSION.

a. Initial supply support.

Upon deployment to the RVN, the 23d SWAD was provided with a 180-day support package of predetermined engine, propeller, airframe, and avionics repair parts and special tools. The list of these parts served as an initial guide for authorized stockage levels. In most instances the list was adequate, but several critical items were not listed, or not shipped, or were furnished in less than the prescribed amount.

b. Pipeline supply support.

Analysis of requisitions for aircraft, avionics, and armament systems repair parts submitted through theater logistics pipelines since the unit arrived in the RVN shows that the initial 180-day support package is not being adequately replenished. Figure B-8, Appendix 3 to Annex B, gives a graphic view of the response for priority 5 and 17 requisitions submitted for TC air items. Only 29 percent of the 646 requisitions were filled. No EDP (priority 2) experience is shown because all EDP requisitions submitted during the test period were filled either directly from factory sources, with assistance from the service representatives, or after the test period ended. Of an estimated 2,500 avionics requisitions submitted, approximately 450 were filled, for a fill rate of 18 percent. Of 197 requisitions for armament systems repair parts, 62 were filled, for a fill rate of 32 percent. In most instances, Navy supply publications were the only source of parts numbers for components of the JOV-1C armament systems. Some difficulty is still being experienced in cross referencing these to federal stock numbers using Army supply manuals.

c. Parts usage.

Usage of selected aircraft, avionics, and armament repair parts, since the unit arrived in RVN in September 1962 is shown in Table B-6, Appendix B.

d. Cost accounting.

The 23d SWAD does not maintain cost accounting records normally required of a direct support field maintenance unit. A cost analysis of repair parts used during the test period is therefore not included in this report.

e. Maintenance/flight-hour equivalents.

Maintenance man-hours required per one flight-hour were computed from time studies of all organizational and field maintenance performed during the periods shown below:

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SECTION VIII - Objective 7 (continued)

DATE	MAN-HOURS OM	MAN-HOURS FM	MAN-HOURS ARMAMENT	FLIGHT-HOURS
7-11 Jan	325	248	92	96
18 Feb - 3 Mar	1008	597	296	296
TOTAL	1333	845	388	392

The resulting maintenance man-hour/flight-hour factors are:

Organizational maintenance - 3.4 to 1

Field maintenance - 2.2 to 1

Armament maintenance - 1 to 1

f. Field maintenance MOS structure.

The field maintenance MOS for multi-engine airplane repairman and component repair specialist does not identify the type of aircraft or component on which men awarded the MOS are trained. Of the eight men assigned in aircraft and component repair positions, none had ever seen or worked with OV-1 aircraft, propeller system, or turbine power plant. An OJT program was required and, with the assistance of the Grumman, Lycoming, and Hamilton Standard service representatives, a rapid improvement in the organic field maintenance capability was attained. The time required to perform periodic inspections decreased from six days to one day or less during the span of the evaluation.

g. Availability.

Figure B-9, Appendix 3 to Annex B, shows the number of days each assigned Mohawk was flyable, EDP, or non-flyable because of maintenance. An aircraft was considered to be flyable if it flew a useful mission during the day. A summation of the graph (Figure B-9) is in the table below:

	Period 1	Period 2	Period 3	Period 4	Period 5	Average
Flyable	53%	86%	91%	86%	77%	79%
EDP	38%	5%	7%	0%	22%	14%
Maintenance	9%	9%	2%	14%	1%	7%
Average Numbers of Aircraft on Hand	6.0	5.1	4.8	4.9	6.0	5.4
Flight Hours	332	373	457	401	605	434

The maintenance figures are not truly indicative of the amount of maintenance performed because much of the maintenance was accomplished at night and is not reflected in the days of maintenance shown on the graph. It should be noted that 85-90 percent availability can be realized if there

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are no shortages of repair parts.

h. Flying hour program.

Combat support requirements dictated that some of the flyable aircraft exceed the flying hour factor of 80 hours per month for Mohawk aircraft in an active combat area, as outlined in DA Supply Bulletin 1-1. This is shown graphically in Figure B-10, Appendix 3 to Annex B. The test has shown that Mohawk can be flown well over 100 hours per month from an operational and maintenance viewpoint, but have been limited in some instances because of the lack of repair parts. The supply system should be geared to operational requirements.

i. Organic field maintenance capability.

With organic field maintenance, the entire maintenance effort is directly integrated with operational requirements by the unit commander. Time losses, usually associated with support by a separate field maintenance unit, are reduced, and although these hours saved cannot be measured, their total is considerable. These savings, when applied directly to the over-all maintenance effort, result in greater efficiency, and higher aircraft availability. Organic maintenance personnel directly identify themselves with the vital tactical missions of the unit, and develop a sense of urgency in returning aircraft to a flyable status as soon as possible. A recommended change to the organic maintenance structure of the current TOE is contained in Appendix 2 to Annex C.

j. Decentralized operation of flight teams.

During four months of the evaluation, support of detached flight teams required decentralization of organizational maintenance. All field maintenance and periodic inspections were performed at the home base. No major problems were experienced, except for equipment shortages, in the flight team structure. See Appendix 2, Annex C for recommended additions to the flight team equipment.

3. (C) FINDINGS.

a. Supply support has not been adequately responsive to maintain authorized stockage levels of Mohawk repair parts.

b. Navy supply publications are not compatible with Army supply publications for requisitioning purposes.

c. Under field conditions, 5.6 aircraft maintenance man-hours are required for each hour of flight, and one additional man-hour for maintenance of the armament system.

d. The field maintenance MOS for multi-engine airplane repairmen and component repair specialist does not identify the specific aircraft or component on which personnel are trained.

e. Mission requirements dictated that several aircraft exceed the 80 hour per month flying hour forecast in SR 1-1.

f. The organic field maintenance capability was instrumental in maintaining a high aircraft availability rate.

g. Decentralized operation caused no major logistical problems.

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TAB VIII - Objective 7 (continued)

4. (U) CONCLUSIONS.

a. The Mohawk is easily maintained under field and decentralized conditions.

b. The supply pipeline to the RVN should be geared to provide timely delivery of repair parts in support of a Mohawk flying factor of 100 hours per month.

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ANNEX A - Reports from supported units

Attached as appendixes are reports from commanders and advisors of units supported during the Mohawk evaluation 15 October 1962 - 15 March 1963.

APPENDIX 1 - Letter from Senior Advisor, II Corps. (Tab A-1)

APPENDIX 2 - Letter from Senior Advisor, 25th Division. (Tab A-2)

APPENDIX 3 - Questionnaire from Senior Advisor, 25th Division (with inclosures from Commanding Officer, 25th Division and Artillery Advisor, 25th Division). (Tab A-3)

APPENDIX 4 - Letter from Senior Advisor, 9th Division (with inclosure, Photo Evaluation Report). (Tab A-4)

APPENDIX 5 - Letter from Rail Security Advisor, II Zone (with inclosure covering rail incident data). (Tab A-5)

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Appendix 1 to ANNEX A

UNITED STATES ARMY
MILITARY ASSISTANCE ADVISORY GROUP, VIETNAM
II VN CORPS DETACHMENT
Pleiku, Vietnam

MAGTN-IIC 12 March 1963

SUBJECT: Improvement of Mohawk Performance in II CTZ. (C)

TO: Commander, U.S. Military Assistance Command, Vietnam
Saigon

1. (C) Currently II CTZ is obtaining interesting and highly favorable results from use of Mohawks in Quang Ngai Province. I believe these results should be carefully examined with a view toward more effective Mohawk utilization in the future.

2. (C) Quang Ngai Province has a high density of hard core VC units in its central, western and southern sectors. Major troop concentrations habitually shoot at surveillance aircraft overflying these areas. Since Mohawk aircraft began operating in the Province they have encountered small arms fire on nearly every day of operations. On three occasions aircraft have been struck by bullets. On one occasion a Mohawk pilot was slightly wounded. On 9 March, one Mohawk crashed in Western Quang Ngai due to unknown causes. On two occasions suspected 57MM recoilless rifle or similar weapon having a explosive round was fired at Mohawk aircraft. One intelligence report from Quang Ngai indicates that VC units have received orders to prepare air defensive plans to counter enemy aircraft.

3. (C) Two Mohawk aircraft are constantly based at Quang Ngai airfield for close and immediate support of the 25th Infantry Division. Results of Mohawk operations there thus far include the following:

a. Rapid production of low level aerial photographs of VC troop dispositions and installations as well as photographic coverage of prospective operational areas of 25th Infantry Division.

b. A large volume of combat intelligence has been produced by visual sightings of troops in the open including weapon emplacements.

c. A bonus effect has been obtained from the defensive machine gun fire put down by the Mohawks when fired upon. Some VC casualties have been observed from these fires.

d. During period 15 February to 8 March, artillery adjustment by Mohawk observers on VC troops sighted accounted for an estimated 65 enemy casualties. Combining these casualties with those noted in paragraph 3 c it is concluded that the Mohawk has either directly or indirectly caused

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MAGTN-IIC
SUBJECT: Improvement of Mohawk Performance in II CTZ (C)

more VC casualties during this period than all other military forces in Quang Ngai, including RVNAF air strikes.

4. (C) Furthermore, I consider that the attack by the well equipped Q 95 VC Battalion in the Bato area on 3 March was relatively impotent. This was most probably due to actions by Mohawk aircraft on the days immediately preceeding the attack. These aircraft were responsible for sighting and adjusting fire on large groups of armed VC within a few thousand meters of the scene of the attack.

5. (C) Despite this fine performance, the full potential of the Mohawk aircraft cannot be realized because of the present test restrictions. I refer to the limitation of armament to the .50 cal machine guns.

6. (C) The Mohawk aircraft consistently locate renumerative targets which are beyond the range of friendly artillery. The majority of these targets are small bodies of troops in the open. In counterinsurgency operations this is the type target most likely to be encountered. These are fleeting targets, and unless immediately engaged, will disperse and disappear. They are long gone before a friendly air strike can be mounted.

7 (C) On the several occasions that the Mohawk has encountered and returned ground fire, the aircraft limitation to .50 cal machine guns has considerably curtailed the effectiveness of this defensive response. It is apparent that the addition of rockets, napalm and small fragmentation bombs would have greatly increased the number of VC casualties inflicted during the past few weeks. Further, this vastly increased fire-power capability would have a profound impact on the VC ability to conduct daylight troop movements. This would seriously hinder their tactical initiative, especially in Quang Ngai Province. It is also believed that this increased defensive firepower would enhance the surveillance capability of the aircraft by allowing greater low level freedom of movement.

8. (C) CONCLUSIONS:

a. Recent Mohawk operations in Quang Ngai Province have been highly successful.

b. Current test restrictions prevent exploitation of the full capabilities of these versatile aircraft.

9. (C) RECOMMENDATIONS:

That Mohawk aircraft supporting II CTZ be authorized additional defensive armament to include rockets, napalm and fragmentation bombs.

S/Hal D Mc Cown
HAL D MC COWN
Colonel, Infantry
Senior Advisor, IIC

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MAGTN-IIC 1st Ind
SUBJECT: Recent Activities of Mohawk and Artillery Units, Quang Ngai Province

UNITED STATES ARMY, MILITARY ASSISTANCE ADVISORY GROUP, VIETNAM
II VN CORPS DETACHMENT, Pleiku, Vietnam, 23 March 1963

TO: Commander, Military Assistance Command, Vietnam
Saigon

Commander, U.S. Army Concept Team in Vietnam (ACTIV)

1. Forwarded herewith is letter, subject: "Recent Activities of Mohawk and Artillery Units, Quang Ngai Province; dated 19 March 1963.

2. This is a more definitive report on Mohawk activities in Quang Ngai Province and will give further backing to my remarks contained in letter, subject: "Improvement of Mohawk Performance in II CTZ," dated 12 March 1963.

S/Hal D Mc Cown
HAL D Mc COWN
Colonel, Infantry
Senior Advisor

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Appendix 2 to ANNEX A

OFFICE OF SENIOR ADVISOR
25th Infantry Division
Quang Ngai, Vietnam

MAGTN-QI 19 March 1963

SUBJECT: Recent Activities of Mohawk and Artillery Units, Quang Ngai Province

TO: Senior Advisor
II Corps
Pleiku, Vietnam

1. In reply to a request from II Corps Advisory Detachment for information on this subject, the following is submitted.

2. Quang Ngai Province is recognized as being one of the most heavily infested Viet Cong areas in South Vietnam. It has been under VC domination since the signing of the Geneva Accord in 1954. Even prior to that time the French were unable to control the populace and area. To deal with the VC threat in this province the Government of Vietnam, on 15 January, designated the province a Special Sector and directed the 25th Division to conduct a "Clear and Hold" Operation to pacify the area and return the population to GVN control.

3. On 15 February 1963 a team, consisting of two JOV-1C (Mohawk) aircraft, four pilots and a photo laboratory, was placed in support of the 25th Division. The division was not scheduled to complete its training until 15 March 1963 and to become fully operational until 1 April 1963. However, the Mohawk team commenced operations immediately to support limited combat operations and to prepare for the support of the forthcoming "Clear and Hold" Operation. Extensive photographic coverage and air observations was of prime importance to the Vietnamese commanders and to the US advisors.

4. Prior to the arrival of the Mohawk aircraft, the collection effort at division level consisted of agent reports from the S2's of divisional units, sector and units under its control supplemented by reports from the District Chiefs, the National Police, the Military Security Service and para-military organizations. The majority of information from all sources consisted of reports of agents who normally have not been trained in observation or reporting and whose means of communications were generally limited to foot or bicycle messengers. Reporting was generally three to five days or more in arrears. Intelligence other than agents reports provided by military units consisted of observations made by the units as they traveled through target areas and, to a limited extent, of information received from patrol reports. It was usually not possible to confirm intelligence from these sources. It should be noted that a large part of the province is inaccessible by road and that military

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MAGTN-QI 19 March 1963
SUBJECT: Recent Activities of Mohawk and Artillery Units, Quang Ngai Province

operations in this area have to date been limited by the availability of combat forces.

5. The introduction of the Mohawks provided a means of collecting information and confirming intelligence gained from other sources by observation and photography within a matter of hours. Furthermore, the tremendous offensive value of the Mohawks became apparent as they consistently followed up discovery of lucrative targets with immediate artillery adjustment yielding excellent results. In addition, the Mohawks provided security to the railroad through frequent low level surveillance flights.

6. The pilots developed a technique of exploting the principle of surprise which caused the VC to disclose their positions. Taking advantage of the speed and maneuverability of the aircraft permitting contour flying and the aircraft's relatively quiet engines, the pilots approach a suspect area from below the level of a ridge line. Since VC camouflage and evasive tactics are weak in Quang Ngai Province, this technique has been particularly effective. (These VC shortcomings may possibly be attributed to previously limited air and ground activity in this area). Whenever the pilot or ARVN observer sights a VC force, distinguished by their anti-aircraft fire, VC uniforms, weapons, and/or evasive actions, the observer calls for artillery fire. Although initially slow, responsiveness of the artillery to the Mohawks was rapidly developed improving its capability to quickly place a relatively high volume of accurate fire on the VC forces.

7. It quickly became apparent that a system was needed to alert artillery units that a Mohawk was operating in the area and was prepared to adjust fire.

a. For targets of opportunity, all artillery units were directed to establish radio communications with the observer when the Mohawk arrived in the area and, to save time, to reorient their weapons in the direction of flight when the aircraft "buzzed" their positions. The Mohawk pilot and observer then performed their normal surveillance techniques. After positive identification and initial adjustment, fire for effect was initiated. Subsequent corrections were transmitted to the guns consistent with the VC reaction. After dissipation of the target the Mohawks assessed fire damage and returned to base for debriefing by ARVN and US agencies.

b. Preplanned artillery adjustment missions were based on intelligence reports. Each day the 25th Div G2 and G3 customarily coordinated artillery in advance and assigned to the Mohawks a specific area in which to search for lucrative artillery targets.

8. The results of these techniques may be seen in the following examples:

a. On the evening of 26 February an area for Mohawk search was established based on current intelligence. In this area (BS 654287) at

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SUBJECT: Recent Activities of Mohawk and Artillery Units, Quang Ngai Province

271040 hours, the Mohawk observed seventy-five (75) VC in single file moving east along a trail. The VC fired on the aircraft which returned machine gun fire and adjusted artillery. The pilot and observer counted ten (10) bodies apparently killed by their machine gun fire and estimated there were approximately fifty (50) additional casualties perpetrated by the artillery fire. The pilot and observer also noted that the VC wore light blue shirts which their post reports and other reports had tended to confirm as indicative of a specific unit (VC 50th Battalion).

b. Just prior to take-off on the afternoon of 2 March the G2 Advisor, 25th Division, asked the Mohawk pilots to check the NUI LON (BS 6430) area to confirm or deny a report received that morning of two companies of VC having moved into the area between 011100H and 011600H. The pilot went over this newly assigned area at about 1430 hours and observed 20 to 25 VC who fired on the aircraft. The Mohawk returned fire and adjusted artillery. Pilot and observer counted five bodies resulting from their machine gun fire and estimated 15 additional casualties due to artillery fire. A moment later the Mohawk personnel observed 3 more VC moving east along a trail (BS638298). The VC fired on the aircraft and the Mohawk returned fire. All three VC appeared to have been hit. The Mohawk continued on its mission and checked the same area on its way back to Quang Ngai at about 1725 hours. This time 20 VC were observed in holes and another 30-50 could be seen nearby. The VC fired on the aircraft and the Mohawk fired defensive machine gun fire, five bodies were counted. Because of communications difficulties, artillery could not be called on the target. Another group of 20 VC fired on the Mohawk at BS 663477. The Mohawk delivered defensive machine gun fire and count 7 VC bodies.

c. At 080930H March a defector's report was received stating that there was a VC company harvesting crops in the VUC LIEN area (BS 657378). Two Mohawk aircraft were diverted from another mission at 0945 hours. They arrived over the area at 0950 hours and observed approximately 12 VC working in the fields. The VC took evasive action when the aircraft flew over. Artillery was called for and adjusted. The number of casualties was unknown.

9. Having become familiar with the terrain and disposition of enemy and friendly elements, the Mohawks have returned to these and other areas and again found lucrative targets without specific missions being assigned. They now arrange their routes to cover one or more of these area of VC activities going to and from assigned objectives areas. The total results of Mohawk offensive activity for the first month of operation, 15 February through 15 March, in Quang Ngai Province, may be seen below:

a. Probable KIA due to artillery: 56 *

b. Probable KIA due to aircraft machine guns: 48 *

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c.	Number of other casualties estimated:	63 **
d.	Structures destroyed:	19
e.	Structures damaged:	6
f.	Number of times artillery adjusted:	33
g.	Number of times Mohawk machine guns employed:	19

* Figures represent bodies on the ground counted by pilots and observers.

** This figure is conservative in as much as in the majority of artillery adjustment missions the Mohawk pilots reported the casualties as unknown.

10. The results in paragraph 9 were achieved by two Mohawks as follows.

a.	Observation missions:	13
b.	Observation-photo missions:	32
c.	Observation-photo-artillery adjustment missions:	8
d.	Artillery adjustment missions:	25
e.	Photo missions:	11
f.	Helicopter evacuation observation missions:	4
g.	Railroad security missions:	7
h.	Night illumination missions:	5
i.	Search and rescue missions:	3
j.	Administrative missions:	9
k.	Total missions:	107 *
l.	Total sorties:	176
m.	Total hours flown:	305

* The Mohawks have drawn fire twenty-six times in twenty-nine days.

11. The results of Mohawk activity in the collection of intelligence has been excellent. During the period 15 Feb - 15 Mar the Mohawks' have

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SUBJECT: Recent Activities of Mohawk Artillery Units, Quang Ngai Province

taken 7,308 photos which have been of inestimable value to the division commander and his staff. These photos have been used to brief air and ground commanders prior to attacks, to estimate strengths of units and to determine types of armament and even tactics employed by the VC. Many photos show deployment of VC defensive positions and some depict aircraft mockups that are believed used to train troops in the employment of leads in firing on aircraft. The low level at which the Mohawks fly has enabled the pilots and observers to pick out small details such as the color of a uniform or type of helmet which has enabled intelligence personnel to identify units and confirm order of battle data.

12. The responsiveness of the Mohawk support has already increased the combat capability of the 25th Infantry Division by: developing and rapidly confirming intelligence, greatly increasing its artillery capability, developing in commanders and staffs both air-mindedness and confidence in the air-ground system, expediting the development of improved air-ground procedures, and by improving morale.

13. It is my considered opinion that the Mohawks' success can be attributed to their immediate responsiveness to the commanders. In a counter-insurgency operation such as we have in Vietnam with its fleeting and elusive targets, the immediate and direct control over an aircraft as swift, silent and well-equipped as the Mohawk, flown by pilots with intimate knowledge of the terrain and the current enemy situation, is an invaluable asset to a commander.

/s/Paul A Baldy
/t/PAUL A BALDY
Colonel, Inf
Senior Advisor

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Appendix 3 to ANNEX A

QUESTIONNAIRE FOR MOHAWK TEST

INSTRUCTIONS:

IT IS REQUESTED THAT THE FOLLOWING QUESTIONNAIRE BE COMPLETED AS OF 15 MARCH 1963 BY THE SENIOR ADVISOR TO THE FOLLOWING UNIT:

25th DIVISION

YOUR ANSWER TO THESE QUESTIONS WILL PLAY AN IMPORTANT PART IN THE FINDINGS OF THE MOHAWK TEST. ANSWERS SHOULD BE AS DETAILED AS POSSIBLE, AND PROVIDE FULL COVERAGE, BOTH PRO AND CON, OF ALL POINTS APPLICABLE TO THE SUPPORT PROVIDED YOUR UNIT.

1. ADVISORY POSITION TITLE: Senior Advisor, 25th Infantry Division.

2. NAME: Paul A. Baldy RANK: Colonel

3. HOW LONG HAVE YOU OBSERVED 23D SWAD OPERATIONS (MONTHS)? ONE.

4. WHAT TYPE MISSIONS HAS THE 23D SWAD PERFORMED FOR SUPPORT OF THE UNIT TO WHICH YOU ARE ADVISOR?

THE 23D SWAD HAS PERFORMED 117 MISSIONS (176 SORTIES) AS FOLLOWS:

a.	OBSERVATION MISSIONS:	13
b.	OBSERVATION-PHOTO-MISSIONS:	32
c.	OBSERVATION-PHOTO-ARTILLERY ADJUSTMENT MISSIONS:	8
d.	ARTILLERY ADJUSTMENT MISSIONS:	25
e.	PHOTO MISSIONS:	11
f.	HELICOPTER EVACUATION OBSERVATION MISSIONS:	4
g.	RAILROAD SECURITY MISSIONS	7
h.	NIGHT ILLUMINATION MISSIONS: (INCLUDES ONE NIGHT SURVEILLANCE)	5
i.	SEARCH AND RESCUE MISSIONS	3
j.	ADMINISTRATIVE MISSIONS	9

5. TACTICAL RESULT OF MOHAWK OPERATIONS:

a. IN THE AREA OF MOHAWK OPERATIONS WHAT IS THE PATTERN OF VC INCIDENTS COMPARED TO PRECEDING PERIODS? INSOFAR AS RECORDS ARE AVAILABLE, SHOW BY TABLES OR GRAPHS THE VC INCIDENT RECORDS BY MONTHS FOR THE PAST YEAR BROKEN DOWN BY FREQUENCY, SIZE, TYPE.

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	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Avg	Feb 16 Mar 15
PROPAGANDA	25	40	25	12	14	26	17	23	22.7	9
HARASSMENTS	40	46	65	63	59	60	47	46	53.2	25
AMBUSHES	7	5	7	1	1	0	9	13	3.7	6
COMMUNICATION SABOTAGE	6	10	7	8	5	13	5	2	7	3
ATROCITIES	14	16	12	7	15	11	10	10	12.9	5
TOTALS	92	117	116	91	94	110	88	94	100.2	48

b. IN YOUR OPINION WHAT HAS BEEN THE CONTRIBUTION OF MOHAWK OPERATIONS TO THE VC PATTERN INDICATED IN PARAGRAPH 5a ABOVE. EXPLAIN THE BASIS FOR YOUR CONCLUSIONS.

Although it is impossible to assess accurately the contribution of the Mohawks in reducing the relative number of incidents during the reported period, I believe that their contribution has been significant. The use of Mohawk aircraft in this area has been a constant harassment to the VC. It is felt that their presence alone has made it more difficult for the VC to move freely anywhere in the Province. The effect of the Mohawk on the VC may be indicated by the recent defection of several VC who have expressed fear of artillery fire and Mohawk aircraft.

c. HAVE MOHAWK OPERATIONS HAD IMPACT ON THE RESPONSE AND EFFECTIVENESS OF THE UNIT WHICH YOU ADVISE?

Yes. Because of the increased information collection ability deep in VC districts and a significant increase in VC casualties on a regular basis resulting from Mohawk artillery adjustment, an aggressive attitude has developed among ARVN, and morale has improved. Specifically, during the reported period, there was a significant increase in the efficiency, combat effectiveness, and esprit de corps in units of division artillery. This can be attributed to the great increase in observed fire missions (from 21% to 59%) resulting in significant VC casualties. Furthermore, a noticeable increase in staff and command emphasis upon rapid reaction to intelligence has resulted.

(1) IF MOHAWKS HAVE PROVIDED ANY INFORMATION OF COMBAT INTELLIGENCE VALUE, WHAT PERCENTAGE OF AREA INTELLIGENCE OBTAINED FROM ALL SOURCES CAN BE ATTRIBUTED TO THE MOHAWKS?

Mohawk operations have provided a significant amount of combat information of operational value to the 25th Division. However, it is impossible to determine the percentage of the Mohawk contribution in relation to all other combat intelligence sources.

(2) DO MOHAWK OPERATIONS PROVIDE ANY TYPE INFORMATION WHICH CANNOT USUALLY BE OBTAINED FROM OTHER SOURCES? IF YES, CITE SPECIFIC EXAMPLES.

It is true that information obtained by use of Mohawks can be provided by other sources. However, the advantage of using Mohawk aircraft is in its specific capabilities and its immediate responsiveness to the commander, of primary significance being the aircraft's photographic capability and its operational capability to quickly develop intelligence.

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(3) WHAT MEANS HAVE BEEN USED TO VERIFY INFORMATION OBTAINED FROM MOHAWK OPERATIONS?

The use of Mohawk aircraft requires no special or unusual effort to verify information. Standard means for verification using other sources have been employed.

HOW ACCURATE WAS THE MOHAWK INFORMATION? GIVE EXAMPLES.

Information provided by the ARVN observer accompanying Mohawk operations has proved no more accurate than reports by other trained observers. The advantage of the Mohawk over other information sources is its photographic capability to confirm observed activity.

(4) IF INTELLIGENCE OBTAINED FROM MOHAWK OPERATIONS WAS USED FOR PLANNING ARVN OPERATIONS, GIVE EXAMPLES WHICH SHOW THE SPECIFIC CONTRIBUTION OF THE MOHAWKS.

Mohawks were required to provide photographic reconnaissance of objective areas for two major heliborne operations during the reported period. In both instances the resulting photographs were of inestimable value in the operational planning and for briefing helicopter pilots and crews.

(5) HAVE ARVN LEADERS OF THE SUPPORTED UNIT EXPRESSED ANY OPINIONS REGARDING THE EFFECTIVENESS OF MOHAWK OPERATIONS? IF IN WRITING, ATTACH THE DOCUMENT. IF ORAL, GIVE THE SOURCE AND SUMMARIZE THE COMMENTS.

(a) Letter from 25th ARVN Infantry Division to Commanding General, II ARVN Corps, Inclosure 2.

(b) G2, 25th Division, regards the Mohawks as a major source of combat information.

(6) SUITABILITIES OF THE MOHAWK FOR TACTICAL AREA SURVEILLANCE. LIST LIMITATIONS OR CAPABILITIES OF THE MOHAWK WHICH AFFECT THE QUALITY OF SUPPORT PROVIDED.

(a) Speed and silence.

Because of the speed and silence of the aircraft it possesses the capability to surprise the VC before they can react, thus increasing its information collecting ability and opportunities for artillery adjustment against what would otherwise be a fleeting target.

(b) Range and endurance.

Range and endurance are effective for operations conducted in this province.

(c) Photographic capability.

The Mohawk photographic capability provides excellent coverage for pin-point targets and narrow strips but is limited in providing effective area coverage. The photograph development capability of the Mohawk

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team stationed in Quang Ngai has been outstanding by providing immediate use of photographs of intelligence value.

(d) Armament.

Although the armament capability of the aircraft appears adequate, armament restrictions and rules of engagement limit the capability of the aircraft to inflict casualties on the VC. If the aircraft were permitted to employ their full capabilities, a significant increase in VC casualties would undoubtably result. In spite of the restrictions for offensive target engagement defensive fires of the Mohawk cal .50 machine guns have accounted for a number of VC casualties.

(e) Communications.

Mohawk radios have provided excellent air ground communications. On several occasions these facilities have been used as a relay between points on the ground.

(7) WHAT TYPE VC ACTIVITY HAS BEEN DETECTED FROM MOHAWK PHOTOGRAPHS AND VISUAL SIGHTING?

(a) Visual.

Visual observation of VC action has been limited only by the capabilities of the observers. VC activities of all types have been observed. Significant sightings include troop locations and movement, and location of VC structures.

(b) Photographic.

Significant VC activities photographed include VC automatic weapon positions, personnel, rope bridges, structures, and base areas.

(8) DOCTRINE, PROCEDURES, TACTICS, AND TECHNIQUES.

(a) COMMENT OF THE EFFECTIVENESS OF THE DIRECT SUPPORT MISSION ASSIGNMENT WITH DIRECT REQUEST CHANNELS TO THE MOHAWK UNIT.

Missions assigned directly to the Mohawk team have proved to be very effective because of its rapid response capability. Furthermore, the opportunity for the division staff to brief and debrief Mohawk crews and the familiarity of the pilot and observer with ground combat support have proved valuable assets to the division in its operations.

WOULD YOU PREFER TO HAVE MOHAWK SUPPORT FURNISHED THROUGH VNAF REQUEST CHANNELS (ASOC)?

No. Aircraft staged at Quang Ngai under the operational control of the senior advisor provide a responsive capability impossible to obtain through ASOC channels. Furthermore, aircraft crews become familiar with the location of friendly elements and local terrain and consequently are more effective when staged in the immediate area.

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(b) IS ALL AIR OR AVIATION ACTIVITY WITH THE TACTICAL ZONE OR SECTOR COORDINATED WITHIN THE TOC OR FSCC OF THE DIVISION?

Not at present. The 25th Division is currently in the process of establishing a TOC. Effective on or about 1 April aviation activity will be coordinated through a TOC.

(c) WHAT PROCEDURE IS USED FOR BRIEFING AND DEBRIEFING MOHAWK CREWS?

Mohawk missions are established in coordination with the Division G2, G3, and their advisors. Specific flight requests are processed through the Division G3 Section and the MAAG Detachment to the Mohawk Team. However, pre-flight briefings are conducted separately for the US pilots and the ARVN observers. Pilots are briefed by the G2 advisor for reconnaissance and photograph missions, and by the G3 advisor for operational missions such as artillery adjustment and flare drops. Simultaneously, Vietnamese observers are briefed by the Division G2 or G3, depending on the mission. Currently, debriefing is conducted separately by ARVN and MAAG personnel after initial post flight coordination between the US pilots and the ARVN observers. This procedure is not entirely satisfactory, the desired procedure being a combined US - Vietnamese briefing and debriefing in the TOC briefing room involving both G2 and G3 representatives. This system will be established as soon as the TOC is functioning (on or about 1 April). Procedures will be established whereby daily briefing and debriefing sessions will be held for all pilots and observers simultaneously, including those off duty.

Immediate missions while aircraft are airborne require mission assignment and essential instructions to be transmitted through US transmission facilities. Confirming instructions are issued to the ARVN observer through the established ARVN air-ground communication facilities. This procedure has proved adequate and will not be changed.

(d) SHOULD INFORMATION OBTAINED FROM MOHAWK OPERATIONS BE FURNISHED DIRECTLY TO THE SUPPORTED UNIT INTELLIGENCE OFFICER OR SHOULD THIS INFORMATION BE EVALUATED AND DISSEMINATED BY A CENTRAL AIR INTELLIGENCE AGENCY?

Information insofar as practical should be furnished directly to the supported unit intelligence officer, and other agencies should be informed of major items of intelligence produced.

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Final Test Report - Mohawk

Inclosure 1 to Appendix 3, ANNEX A

MAAG DETACHMENT
25th Inf Division
Quang Ngai, Vietnam

13 March 1963

SUBJECT: Impact of Mohawk Activity on 25th Division (ARVN) Artillery Units.

TO: Senior Advisor
25th Inf Division
APO 137, U.S. Forces

1. During the period 16 February to 15 March 1963, there has been a significant increase in the efficiency, morale and espirit de corps in units of Division Artillery. The major contributing factor is the arrival of the Mohawk aircraft in Quang Ngai Province. In support of this statement, listed below are some of the statistical data obtained from the records of the Division Artillery units:

a. Prior to the arrival of the Mohawk aircraft (1 Aug 62-15 Feb 63), 21% of all fire missions were observed. Subsequent to the arrival of the Mohawk aircraft, (16 Feb 63 - 15 Mar 63), 59% of all fire missions were observed.

b. Of the above 59% of observed fire missions, 46% were observed by Mohawk aircraft and 13% by ground and L-19 observers.

c. In addition, a large percent of the unobserved missions fired subsequent to the arrival of Mohawks have been fired as a result of target information obtained by Mohawks photo coverage and aerial surveillance of areas of know VC activity. The location of targets on which H & I fires are delivered has significantly increased the enthusiasm of the Div Arty Units for this type of mission.

d. Further, during the period 1 August 1962 through 15 February 1963, a total of 7,461 rounds were fired from all tubes of Div Arty. During the period 16 February through 15 March 1963, a total of 1,584 rounds were fired. This represents a significant increase in the expenditure of ammunition.

2. The effects of Mohawk activity upon the morale and espirit of Div Arty units cannot entirely be measured in statistical data. One must see the facial expressions and spontaneous reactions of the gun crews when contact is established with the Mohawk. The sight of or contact with the Mohawk instills a vigor and willingness in the men that is immeasurable in terms of statistics. The tangible results of these emotions however, can be seen in the overall decrease in response time of the crews to fire a mission. Previous response time could sometimes be measured in hours. Now in many cases response is measured in seconds.

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ACTIV-AM
Final Test Report - Mohawk

Inclosure 1 to Appendix 3 ANNEX A

SUBJECT: Impact of Mohawk Activity on 25th Division (ARVN) Artillery Units.

3. The overall impact of the Mohawk support has increased the combat effectiveness of Div Arty units by decreasing response time for fire missions, increasing accuracy of fire and developing teamwork within the unit as well as with the air. The aerial platform, provided by the Mohawk, immediately responsive to the artillery and the willingness of the air crew to share the battle with those on the ground will continue to make a significant contribution to the ending of the counter-insurgent effort in Quang Ngai Province.

/s/Clarence O. Lee
/t/CLARENCE O. LEE
Captain, Artillery
25th ARVN Div Arty Advisor

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Final Test Report - Mohawk

Inclosure 2 to Appendix 3, ANNEX A

HSAS TRANSLATOR GROUP LOG Nr 744
PAGE 1 OF 3 COPY 1 of 2

REPUBLIC OF VIETNAM
R.V.N.A.F.
II CORPS
25th INFANTRY DIVISION
STAFF - G3
Number 433 /SD25/TM3/1
APO 4131, 20 March 1963

FROM: Colonel LU IAN
C.O. 25th Infantry Division
Concurrently C.O. QUANG
NGAI Military District

TO: C.G. II Corps
Concurrently II CTZ
(STAFF/G3)

SUBJECT: Extension of the Period of Attachment of 2 MOHAWK Aircraft.

Two MOHAWK aircraft have been attached to the 25th Infantry Division since 15 February 1963 for a period of testing. Their attachment must end on 15 March 1963.

The two MOHAWK aircraft proved that they were very useful in many operations after over a month of attachment to QUANG NGAI Military District. Their main mission was to photograph the areas we designate to contribute to the collection of intelligence information necessary to the operations to be conducted by 25th Infantry Division. During 34 days of attachment, the 2 MOHAWK aircraft flew 176 missions flew 305 hours and provided us with 7308 aerial photographs.

Simultaneous with these photographing missions, MOHAWK aircraft directed Artillery fire whenever they discovered VC bases or concentration areas. MOHAWK aircraft were used in very accurate observation and fire adjustment and caused heavy casualties to the enemy by directing Artillery fire:

- 90 VC killed on the spot
- About 200 VC wounded
- 160 VC houses burnt down

Considering the services rendered, the following advantages of MOHAWK aircraft are noticed:

1. They can fly at sufficiently high speed to avoid the enemy ground fire and to conduct surprise attacks.

2. They can fly at sufficiently low speed to take photographs and observe the terrain.

3. They can carry out long range activities in an area like QUANG NGAI Military District.

4. They are sufficiently armed to hold the enemy until Artillery fire is adjusted.

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For these reasons, we request that you intercede with higher authorities so that the period of attachment of the 2 MOHAWK aircraft can be extended.

/ Signed and Sealed /

COPIES TO:

* Presidency/Personal Staff
* DOD/Personal Staff
* JGS/J3 - J2
* ACTIV - MAAG/25th Div
* Division/G2

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ACTIV-AM
Final Test Report - Mohawk

Appendix 4 to ANNEX A

HEADQUARTERS
9TH INFANTRY DIVISION ADVISORY DETACHMENT
U.S. Army Military Assistance Advisory Group
Qui Nhon, Vietnam

MAGTN-QN 13 March 1963

SUBJECT: Mohawk Evaluation Report

THRU: Senior Advisor
II Corps
Pleiku, Vietnam

TO: Chief, ACTIV
APO 143, US Forces
ATTN: Lt Col Shoemaker

1. Experience gained through employment of the Mohawk flight team supporting the 9th Infantry Division has established that these aircraft have been the primary, immediately responsive means of air support available to the ground commander. I will not comment as to whether or not the Mohawk is the best available hardware to fulfill the requirement for close air support, since current restrictions preclude utilization of its full capability. The point I want to make however, is that the concept of employment of the flight team with the 9th Infantry Division has proved to be the most effective method to satisfy the close air support requirement in our situation.

2. Liaison, briefing requirements, and response time have been minimized through the deployment of pilots and observers who live with the tactical situation on a day to day basis. Because of this established familiarity, these aircraft have consistently become airborne and on the way to the target area within a matter of minutes from initial notification of an immediate request. This capability is of paramount importance when reaction time is our most precious commodity, an aspect of the situation well understood by the Viet Cong.

3. Recent instances illustrating Mohawk responsiveness are listed below:

	MSN NR	DATE-TIME-OF-RECEIPT	DATE-TIME-ON-TGT
a.	Q3-2-149	20 Feb 63 - 0910	20 Feb 63 - 0945
b.	Q3-2-156	21 Feb 63 - 1500	21 Feb 63 - 1610
c.	Q3-2-157	22 Feb 63 - 0820	22 Feb 63 - 0955

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Final Test Report - Mohawk

Appendix 4 to ANNEX A

MACTN-QN
SUBJECT: Mohawk Evaluation Report

	MSN NR	DATE-TIME-OF-RECEIPT	DATE-TIME-ON-TGT
d.	Q3-2-158	22 Feb 63 - 0900	22 Feb 63 - 1015
e.	Q3-2-164	25 Feb 63 - 0800	25 Feb 63 - 0830
f.	Q3-2-168	25 Feb 63 - 1500	25 Feb 63 - 1530

4. Aerial photography obtained from the Mohawks has assisted materially in preparing intelligence estimates by the division G2, locating targets for pre-planned air strikes, and determining specific objective areas for ground maneuver elements. Results of recent Mohawk photo missions are listed in Inclosure 1.

5. From where VNAF tactical aircraft are based, it takes forty-five minutes on the average for the aircraft to arrive on station over our area of tactical responsibility from the time the pilots have been briefed and are strapped into the cockpit. When considering this, plus the elapsed time spent in processing the air request through battalion, regiment, division, corps TOC and ASOC (a process caused by existing means of communication and geographical separation of units), the reluctance of ARVN commanders to request emergency VNAF air support due to the futility of the effort is more easily understood.

6. In summary, the assignment of Mohawk support to the 9th Infantry Division has demonstrated to me, my subordinate advisors, and our ARVN counterparts that effective tactical air support under the conditions of warfare as we know them can best be achieved by decentralized, direct support aircraft immediately available to the ground commander.

S/Victor M. Anido, Jr
VICTOR M. ANIDO, JR
Colonel, Infantry
Senior Advisor

1 Incl
as

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Final Test Report - Mohawk

Inclosure 1 to Appendix 4, ANNEX A

HEADQUARTERS
9TH INFANTRY DIVISION ADVISORY DETACHMENT
U.S. Army Military Assistance Advisory Group
Qui Nhon, Vietnam

MAGTN-QN 13 March 1963

SUBJECT: Photo Evaluation Report on Mohawk

TO: Senior Advisor
II Corps
Pleiku, Vietnam

1. This report covers the period of 2 December 1962 to 28 February 1963.

2. During the month of December 1962, three photo missions were flown. Mission 62-12-293 was requested on 140730 December with the TOT 1030 hours the same day and photos to be delivered NLT 15 December. The Intelligence Center received the photos on 151200 December. On 241200 December, mission 62-12-333 was requested. The requested TOT for this mission was 241400 December. This mission was flown but due to mechanical failure of the camera, the photos did not turn out. The mission was again requested on 261005 December and the Intelligence Center received the photos the same day. This was before the deadline of 271800 December. The third request was submitted on 270900 December and flown as mission 62-12-339. Requested photos were delivered to the Intelligence Center on 280930 December, as requested. See Inclosure for details of photos.

3. In January 1963, two missions were requested. The first mission Q3-1-22 was requested on 9 January and flown the same day with the photos being delivered to the intelligence center on 101000 January. The second mission, Q3-1-33, was requested on 19 January and flown at 1350 hours the same day. The intelligence Center received the photos 220900 January, one day after the date requested. See Inclosure for details of photos.

4. There were six photo missions requested in February. One of the six was a night photo mission which was flown but due to mechanical trouble no photos were received. Two other requests were flown but no photos due to the weather conditions over the target. Photo mission Q3-1-72 was an immediate request with the TOT being 021130 February and the photos being delivered the same day, one day before the date requested. Two routine missions were flown, Q3-2-82 and Q3-2-108. On mission Q3-2-82, the photos were delivered two days before the deadline. The photos for mission Q3-3-108 were delivered one day late. The TOT was one day prior to the date requested. The delay in delivery of photos was due to non-availability of aircraft to deliver the photos from Nha Trang. See Inclosure for details of photos.

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Final Test Report -- Mohawk

Inclosure 1 to Appendix 4, ANNEX A

MAGTN-QN
SUBJECT: Photo Evaluation Report on Mohawk

5. Photos obtained from above mentioned missions and other photos, which were not requested by G-2 Air, assisted materially in preparing intelligence estimates by the G-2, 9th Inf Div.

S/Victor M. Anido, Jr
VICTOR M. ANIDO, JR
Colonel, Infantry
Senior Advisor

Info:
Commanding Officer
23rd Special Warfare Aviation Detachment
Nha Trang, Vietnam

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Final Test Report - Mohawk

Inclosure 1 to Appendix 4, ANNEX A

The following suspected VC installations were detected from photos taken on missions indicated:

Mission 62-12-293 (14 Dec 62):

Along Nuoc Sand River (BS725087) - Many houses
BS 681208 - 1 house
BS 685207 - 6 houses under trees
BS 692205 - 1 house
BS 693202 - 3 houses
BS 621197 - 1 house at ea coordinate with a connecting trail
BS 620196/.
BS 624189 - 1 house
BS 625195 - 3 houses
BS 629197 - 1 house
BS 628193 - 2 houses
BS 632200 - 5 houses
BS 627185 - 2 houses
BS 637165 - 1 house
BS 639163 - 1 house
BS 670052 - 3 houses
BS 670055 - 1 house

Mission 62-12-333 (26 Dec 62):

BR 627974 - 3 houses along stream with a foot path leading to the stream. (Houses dug into the ground)
BR 631970 - 3 houses
BR 641949 - 7 houses near corn field
BR 642931 - 3 houses near corn field

Mission 62-12-339 (27 Dec 62):

BR 535981 - 6 houses
BR 535879 - 1 house
BR 547978 - 10 houses with connecting trails
BR 551985 - 2 houses

Mission Q3-1-33 (19 Jan 63):

BQ 757893 - 15 houses and field; suspected VC supply area.
BQ 767920 - 4 houses and fields, suspected VC supply area.
BQ 785810 - A few scattered houses; suspected VC supply area.

Mission Q3-1-72 (21 Feb 62):

BQ 738703 - 4 houses
BQ 718693 - 4 houses; appeared to be warehouses

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Appendix 5 to ANNEX A

RAILWAY SECURITY ADVISOR
MILITARY RAILWAY SECURITY SERVICE (MRSS)
II ZONE

22 March 1963

SUBJECT: Air Reconnaissance Support

TO: Senior Railway Security Advisor
Studies and Analysis Branch
Organization and Training Division
United States Army Section, MAAG
APO 143

1. (U) General: The mission of the Military Railway Security Service is to provide security for railroad rolling stock, passengers, and freight of the National Railroad of South Vietnam. This is accomplished through utilization of all available resources, ground and air. The vulnerability of the railroad and its rolling stock to sabotage and attack by dissident elements can not be minimized. It is a symbol of the Government and is recognized as such by all Vietnamese. One man, Viet Cong (VC) or ordinary citizen, can effectively disrupt the flow of rail traffic and/or cause considerable damage to rolling stock. The railroad in general traverses sparsely populated areas and terrain idealy suited to insurgency operations.

"Clear and Hold" operations by the Government are generally proceeded by an increase in railroad incidents. In several cases it is obvious that VC action against the railroad is primarily for propaganda purposes, i.e. A major "Clear and Hold" operation is proceeded by a serious rail incident or sequence of incidents and completion of the operation is marked by a serious rail incident or sequence of incidents. Nothing is more dramatic, widely disseminated, or exaggerated than a major rail incident.

2. (U) The following documents are attached as enclosures:

a. Disposition form, dated 19 Nov 62, subject: "Railway Security, II Zone," Enclosure Nr 1. (omitted, see Monthly rept #2)
b. Enclosure Nr II, Disposition form, dated 26 Nov 62, Subject: "Derailment of Night Train." (omitted see Monthly rept #2)
c. Enclosure Nr III, Graph, "Train Derailments."
d. Enclosure Nr IV, Graph, "Enemy Fire on Train," and "Total Rail and Telegraph."
e. Enclosure Nr V, Graph, "Mine Incident" and "Derailments"
f. Enclosure Nr VI, Graph, "Mines, Train, by Type"

3. (C) On 1 November 1962, the 23d Special Warfare Aviation Detachment initiated daily air surveillance and reconnaissance of the National Railroad

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of Vietnam from ZT 137/085 to BS 907/140 (AMS Series 509P, 1/250,000) a distance of 569 kilometers of direct line trackage.

Prior to 1 November 1962, VNAF air cover and fighter aircraft support was available to the MRSS, II Zone, on a monthly allotted basis of 18 missions per month for train escort and unlimited fighter support missions when the train was under attack by the VC. Reconnaissance flights to determine the security status of routine rail traffic, if the VC were active in the immediate area of the rail-right-of way, and the condition of the railroad, i.e. rails removed, separated, telegraph line out, obstacles on track, etc., were not authorized as such by the Government directive initiating active support of the MRSS issued by Headquarters II Corps, dated 17 August 1962, based on a directive from the Minister of National Defense dated 17 July 1962.

Field command, ARVN message text nr 02753, requested the MRSS to find a substitute for VNAF support of the night trains during the months of November, December, and January, 1962-63. Conferences between VNAF and USAF Advisors, MRSS, and MRSS Advisor on 14 September 1962, requesting night support of train operations in the II Zone, MRSS, revealed that VNAF would not provide night support because of proficiency level of pilots and lack of sufficient personnel.

4. (U) During the period 1 November 1962 - 28 February 1963, the 23d Special Warfare Aviation Detachment, provided the following air support to the II Zone, MRSS:

a. Daily reconnaissance and surveillance of the railroad between ZT 137/085 and BS 907/140, a distance of 569 kilometers, weather and Priority I and II missions permitting. On 21 January 1963, the area of surveillance was extended to BS 5600 an additional 100 kilometers.
b. Night support of the MRSS, II Zone, when requested as a result of VC action or expected VC action.
c. Photographic missions.
d. Special missions on request when intelligence indicated possible increase in VC action along rail-right-of-way.
e. Spot surveillance of a critical area when intelligence reports indicated possible VC movement from one area to another that would require the VC to cross the rail-right-of-way.
f. Special flare missions based on analysis of previous VC actions in an effort to trap the VC and/or prevent damage as a result of VC sabotage during the hours of darkness.

5. (C) Enclosures Nr III, IV, V and VI, are graphs depicting types of VC activity and nature of incidents in the II Zone MRSS. Of primary importance as reflected in Enclosure Nr III, is that the VC have made no effort to launch a major attack against a train in II Zone since 16 October 1962. Major attacks occured on 16 October, 3 October, 17 August, etc,. A distinction between major attacks and harrassing fire is mandatory. In many cases 4 to 12 VC will disperse around the area of a train derailment and deliver sporadic fire from 1 to 45 minutes. Since 6 November 1962 this has been the general practice with one or two exceptions. Major damage during the period 1 November 62 - 28 February 63, has been as a result of electrical mines complicated by the speed of the train at the time the mines were detonated. This is especially true for

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the derailments of 21 January and 10 February 1963. On several occasions aircraft of the 23d SWAD have arrived over a derailed train 15 to 45 minutes after derailment on routine rail reconnaissance flights or while returning from another primary mission. Said aircraft have relayed the first information on the train incident, and provided support requested consistent with the existing rules of engagement. Active surveillance of the railroad is a strong deterent to VC preparation of necessary positions to effectively attack an escorted train. Daily reconnaissance is also a deterent to VC attacks on unescorted trains since improved communications plus air reconnaissance enhances the possibility of rapid detection by government forces followed by swift punitive action against an ideal target.

6. (C) To make a positive assertion that any single type of action has, without reservation, been solely responsible for this or that result in a counter-insurgency operation, is to assume that it would be possible to replay the sequence of events under the exact conditions that first existed with all its variables. Such a procedure, while never possible in active warfare, would of course prove or disprove the relative contribution of a single phase of an operation. This being impossible, the following points are offered in support of active daily reconnaissance and surveillance of the railroad in a counter-insurgency operation by aircraft immediately responsive to the desires of the responsible ground officer:

a. Mine incidents dropped from a high of 6 during the month of October 1962 to an average of one per month during November, December and January, 1962-1963, increasing to 5 per month in February 1963 (Enclosure Nr III and V).

b. There were no daylight actions against a train in November 62, only one in December 62, one in January 63, and two in February 63.

c. Electrical mines in northern Phu Yen Province and southern Binh Dinh Province were standard practice until 6 November 1962, when a pressure mine was used to mine the Hue to Saigon night train. No mines were used again in this area until 11 February 1963 when the second of two electrical mines mal-functioned in an effort to seriously damage Train Nr 27, Hue to Saigon, night train. Mines employed against the night train, Hue to Saigon, in this area on 15 and 24 February 1963, were of the pressure activated type. It is possible that the combination of air surveillance and troop activity in the area have so reduced the time frame available to the VC to properly emplace an electrical mine, camouflage it, and conceal the wires leading to the point where the demolition man will detonate the charge that the VC have decided that hasty installation, possible malfunction, and increased possibility of detection out weigh any advantages to be gained.

d. No major VC effort has been made to capture or loot a train in the II Zone MRSS since 16 October 1962.

e. No mission has been refused by the 23d SWAD. At times missions have been requested when it was known only that a train was overdue. Mission requirement was to locate the train, determine its status, offer such assistance as possible, and report results soonest possible to Hqs, MRSS, II Zone.

f. Mission request are made directly to the 23d SWAD, in most cases the pilot to fly the mission is briefed by the requestor. Acceptance or rejection of a mission is known immediately. There is no uncertainty or indecision on the part of the MRSS concerning its next offensive move since aircraft support status is known on request.

g. Response time has been excellent in all cases. Missions accepted without a stand-by night crew have been ready to take off in 25 minutes from

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time of initial notification.

h. Active communications between escort personnel, MRSS Sub-Zone, Headquarters, and aircraft of the 23d SWAD is maintained on a daily basis by means of standared Army FM radios.

i. MRSS escort troop morale has improved. Daily reconnaissance and surveillance by the 23d SWAD has made evident the fact that air support exist and is readily available.

j. Night support missions were not available to the MRSS, II Zone, until the 23d SWAD provided such support. The first night support mission was flown on 6 November 1962. Following night mission of 15 November 62, the Rail Security Advisor was notified by the Deputy Director, Sub-ASOC II, that a C-47 Flareship would be available in Nha Trang to support the MRSS and the II Corps tactical zone from that date. Present directive as written does not permit the Chief, MRSS, II Zone sufficient lattitude in using this aircraft to meet his requirements for night air support of the train, i.e. when communications is lost between the train, for any number of reasons, the Chief MRSS does not feel he can within the authority of the VNAF directive call on the C-47 Flareship to undertake a search mission when the only problem may be a radio failure, bad weather interferring with transmission, a radio relay station operator who has gone to sleep, etc.

7. (C) Conclusions:

a. The proven advantages of the 23d SWAD in supporting the MRSS are:

(1) Immediate response to the ground officer requesting support and or assistance.

(2) Rapid response to request.

(3) Organic communication system in aircraft designed for ground to air communication using standard items of Army issue.

(4) Pilots aware of the problems of a ground officer and the necessity for immediate response to request for air support.

(5) All personnel have evinced an awareness that the aircraft of this unit are an additional tool whereby the ground commander can more effectively execute his assigned mission. Every effort of the unit is oriented to facilitating his use of this tool.

b. The limitations of the 23d SWAD:

(1) Aircraft has a fighter configuration but is not permitted to use the weapons at will to support MRSS.

(2) The initial psychological value of the fighter configuration of the aircraft as an air surveillance vehicle which could not only seek out its target but take it under fire has been negated by the wide publicity given to the fact that it can not deliver fire unless fired upon.

c. VNAF elements that support the MRSS are capable and have performed authorized missions in an efficient manner on request. The 2d Fighter Squadron, VNAF, has provided excellent support for the MRSS. The request system utilized by the MRSS, when direct fighter support is needed, while unorthodox has achieved satisfactory results. Train escort missions are excellent by L-19's (VNAF) of the 3d Liaison Squadron when requested thru ASOC at least 24 hours, ahead of time. The primary difficulty encountered by the MRSS in utilization of VNAF aircraft is the system requiring that request, even on an emergency basis be initiated through a third party, basically on ASOC or Sub-ASOC. This results

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in the interposition between the requestor and the action agency of a third party, unnecessary delay in transmission of the request, possibility of failure to relay completely the necessary data to the action agency, requestor does not know for certain that the request will be honored expeditiously or not at all, plus an increased time frame from requirement to execution that could result in complete loss of target or success by the VC in achieving their objective.

S/Lewis N. McGuyre
LEWIS N. MCGUYRE
Major AIS
Rail Sec Adv, II Zone, MRSS

Distribution:
1 - Sr Rail Sec Adv
1 - Sr Adv, II Corps
1 - Sr Adv, III Corps
1 - CO, 23d SWAD
1 - Chief Mohawk Committee, ACTIV
1 - File

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Inclosure 1 to Appendix 5, ANNEX A

TRAIN DERAILMENTS

MONTH	Bong Mi	Thap Cham	Dalat Nha Trang	Tuy Hoa	Qui Nhon	[illegible]	Rail Sabotage	Mine	Weapons Fire	Attack	REMARKS
JUN	1 1					2	X	X	X	X	
JUL	1 1 1			1		4	X X	X X		X X	VC boarded unescorted train locomotive and tender only
AUG	1			1		2	X	X		X	All out effort by VC
SEP	1			1 1	1	4	X	X X X	X X		Unescorted empty freight
OCT.	1			1 1		5	X X	X X X		X X	Attack on Wickham trolleys Attack on Wickham trolleys
NOV				1 1 1		4	X X X	X	X X		25 Nov no serious damage
DEC	1				1	2	X	X	X X		Not a major effort
JAN	1		1	1	1	4	X X X	X	X		Possible opns procedures
FEB				1 1 1	1 1	5	X X X X X	X X X			
TOTAL	10	0	1	15	6	32	14	18	11	6	Major attacks, Jun, Aug, & Oct

ENCLOSURE NR III

Page 1
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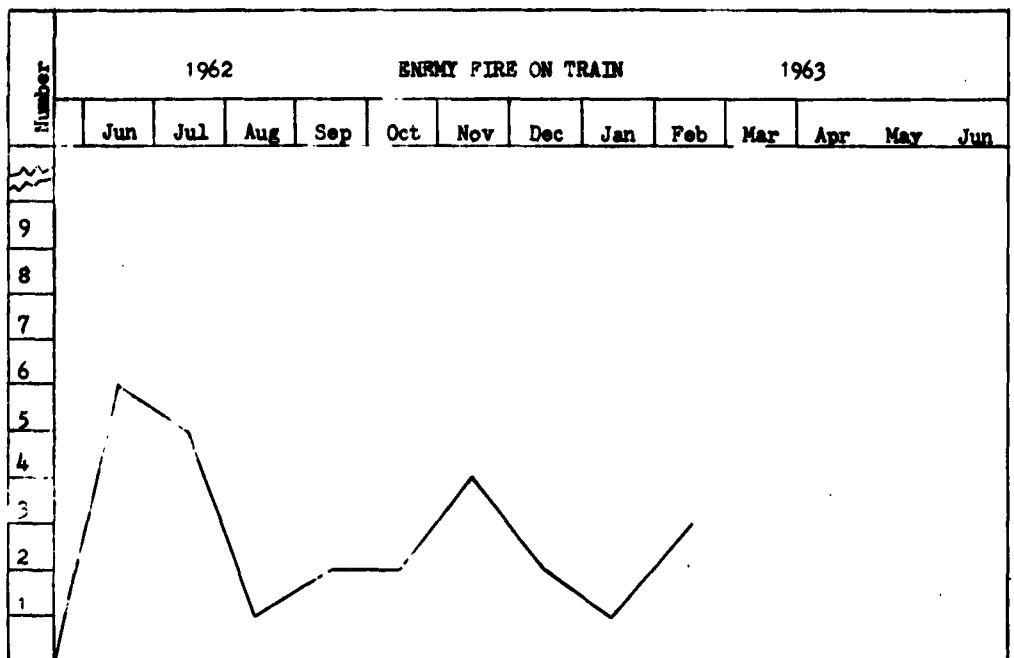
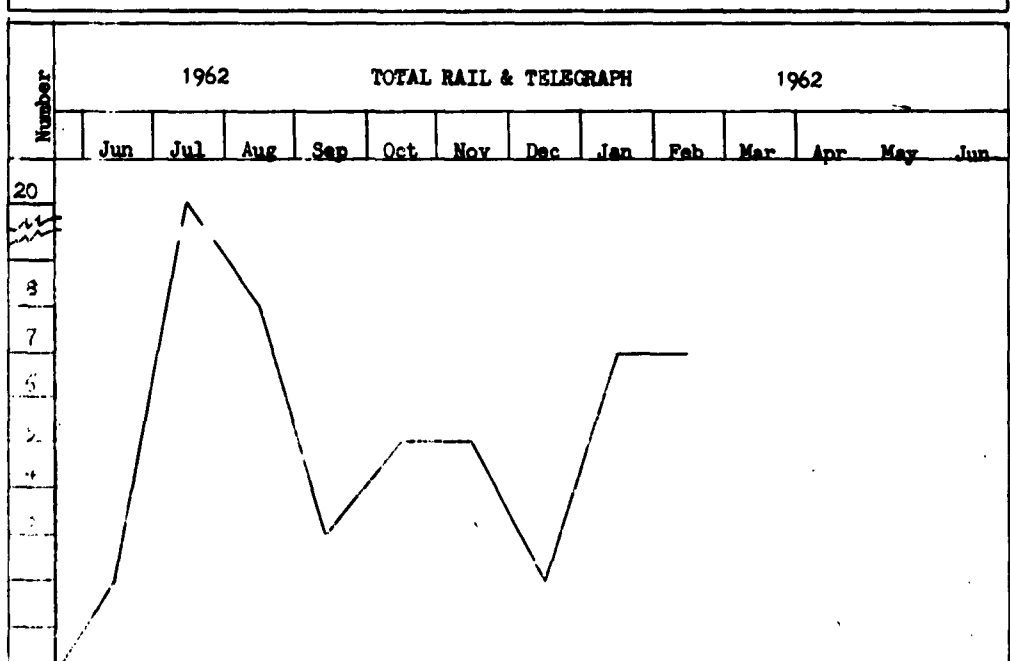
ACTIV-AM
Final Test Report -- Mohawk



REMARKS: Includes attacks, firing on moving train, and weapons fire on a derailed train, in some cases 2 or 3 rounds.



S: Incidents above reflect total number of times VC have separated or removed rails and/or cut the telegraph lines.

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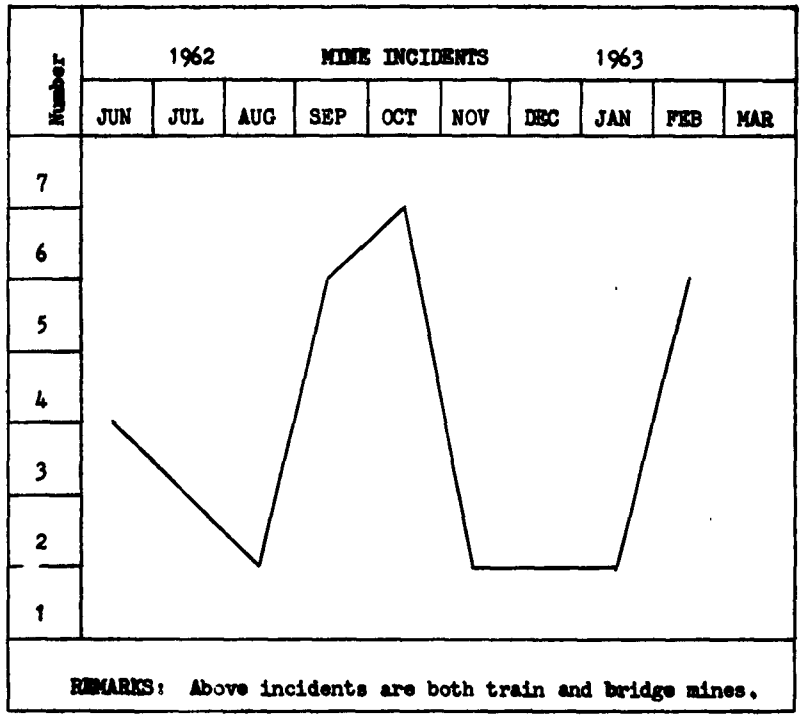
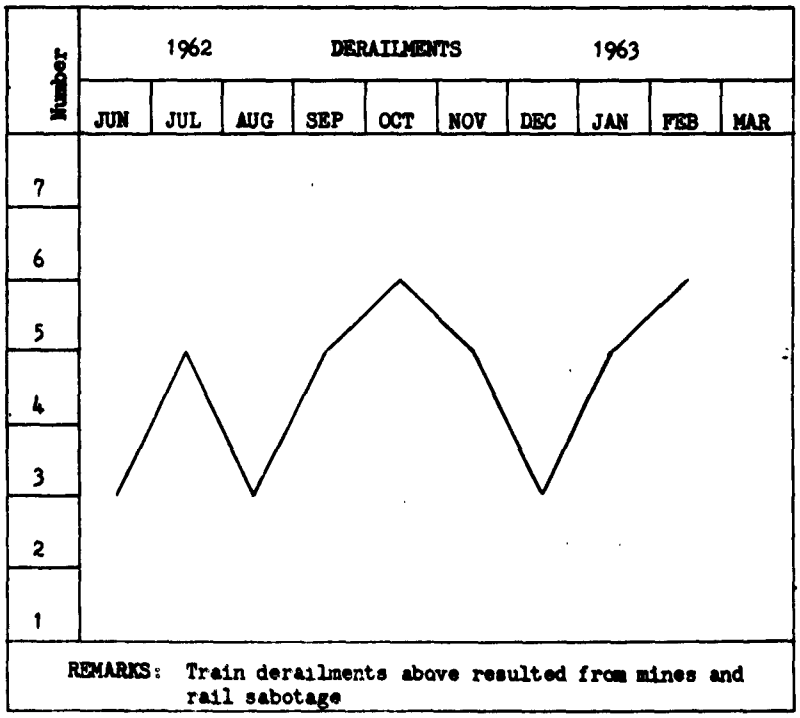


REMARKS: Above incidents are both train and bridge mines.



REMARKS: Train derailments above resulted from mines and rail sabotage

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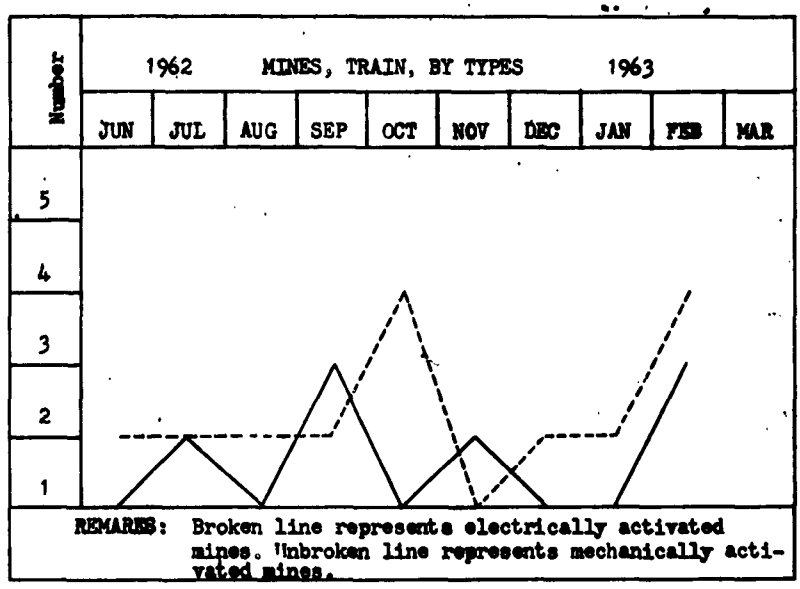
ACTIV-AM
Final Test Report -- Mohawk



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AOTIV-AH
Final Test Report — Mohawk

ANNEX B — Statistical summaries

This annex consists of statistical summaries that support Sections II, III and VIII. Contents are as follows:

APPENDIX 1 - Supporting data to Section II, Objective 1, (Area surveillance) (Tab B-1)

APPENDIX 2 - Supporting data to Section III, Objective 2, (Suitability of the aircraft) (Tab B-2)

APPENDIX 3 - Supporting data to Section VIII, Objective 7, (Logistics problems) (Tab B-3)

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Appendix 1 to ANNEX B

SUPPORTING DATA TO SECTION II, OBJECTIVE 1, AREA SURVEILLANCE

Contents

Table B-1 - VC incidents in Binh Dinh Province

Table B-2 - VC incidents in Quang Ngai Province

Table B-3 - Railway incidents in three RVN Security Zones

Figure B-1 - Time of day of railroad surveillance, and VC incidents, Zone II, Nov 62

Figure B-2 - Time of day of railroad surveillance, and VC incidents, Zone II, Dec 62

Figure B-3 - Time of day of railroad surveillance, and VC incidents, Zone II, Jan 63

Figure B-4 - Time of day of railroad surveillance, and VC incidents, Zone II, Feb 63

TAB B-1

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Appendix 1 to ANNEX B (continued)

TABLE B-1

VC INCIDENTS IN BINH DINH PROVINCE

May 62 - - - Feb 63

Type	May	Jun	Jul	Aug	Sep	Oct	Nov*	Dec*	Jan*	Feb*
Propaganda	2	15	26	19	9	6	17	17	22	7
Commo Sabotage	9	0	6	1	3	8	3	2	0	5
Harassments	14	35	58	37	23	36	47	26	20	41
Atrocities	7	32	14	15	9	18	25	16	12	11
Ambushes	3	4	4	2	4	5	3	10	4	4
Monthly totals	35	86	108	74	48	73	95	71	58	68
Monthly Average	72									

* Full months of Mohawk surveillance

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TAB B-1

TABLE B-2

VC INCIDENTS IN QUANG NGAI PROVINCE

Jul 62 - - 15 Mar 63

Type	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Avg	Feb Mar
Propaganda	25	40	25	12	14	26	17	23	22.7	6
Harassments	40	46	65	63	59	60	47	46	53.2	25
Ambushes	7	5	7	1	1	0	9	13	3.7	5
Communications sabotage	6	10	7	8	5	13	5	2	7	2
Atrocities	14	16	12	7	15	11	10	10	12.3	4
Totals	92	117	116	91	94	110	88	94	100.3	42

*Month of Mohawk operations

TABLE B-3

RAILWAY INCIDENTS IN THREE RVN SECURITY ZONES

Jun 62 - Feb 63

1962	I ZONE (162 km)	II ZONE (679 km)	II ZONE (365 km)
Jun	10	13	2
Jul	7	26	1
Aug	3	10	2
Sep	5	12	1
Oct	6	10	1
Mohawk Operational Period			
Nov	13	9*	1
Dec	13	3*	1
Jan 63	3* *	8*	0
Feb 63	0* *	10*	0

* Full months of Mohawk reconnaissance

** Beginning 21 Jan 63, Mohawks conducted regular railway reconnaissance in Quang Ngai Province, I Zone.

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TIME OF DAY OF RAILROAD SURVEILLANCE, ZONE II
NOVEMBER 1962
(Showing time major incidents occurred or discovered)

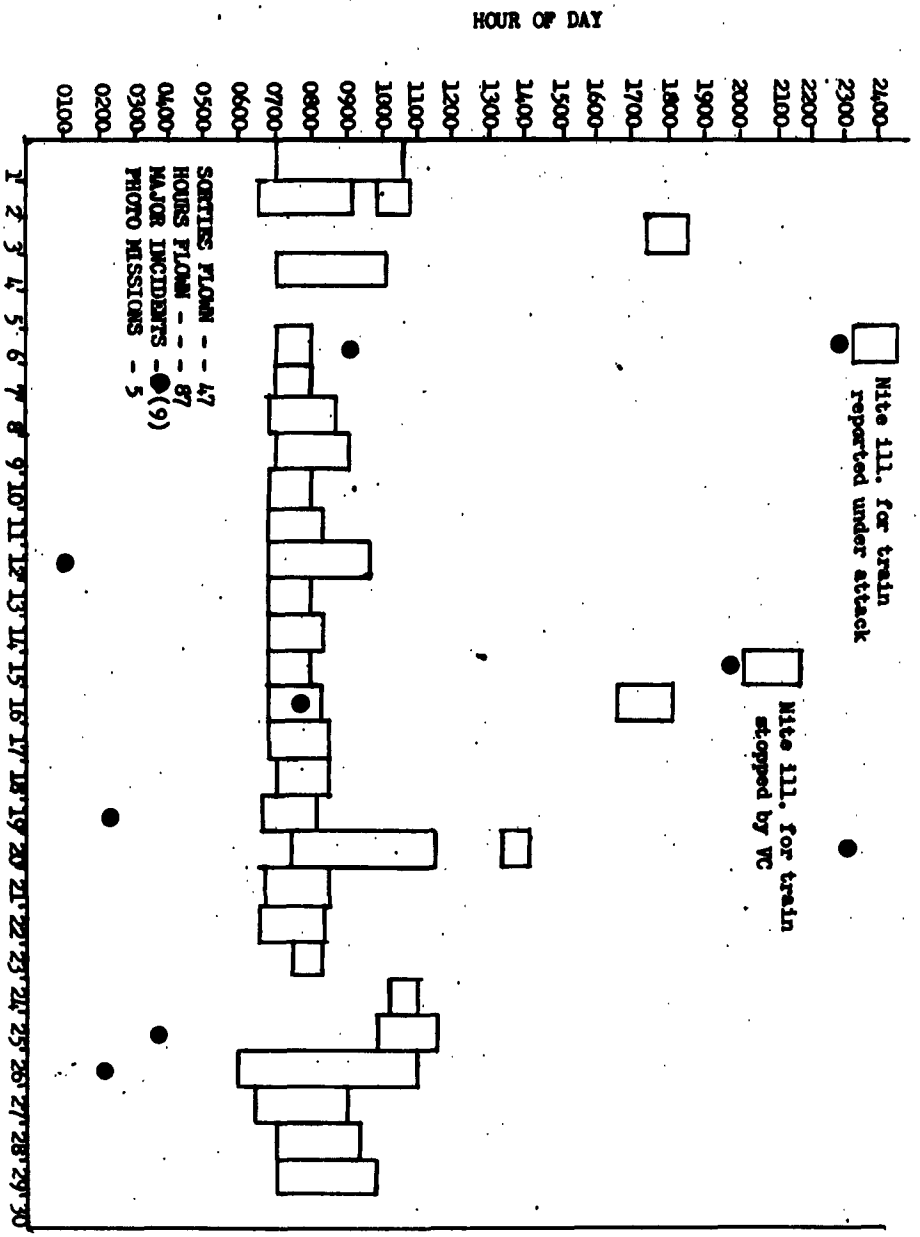

FIGURE B-1

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TIME OF DAY RAILROAD SURVEILLANCE, ZONE II
DECEMBER 1962
(Showing time major incidents occurred or discovered)

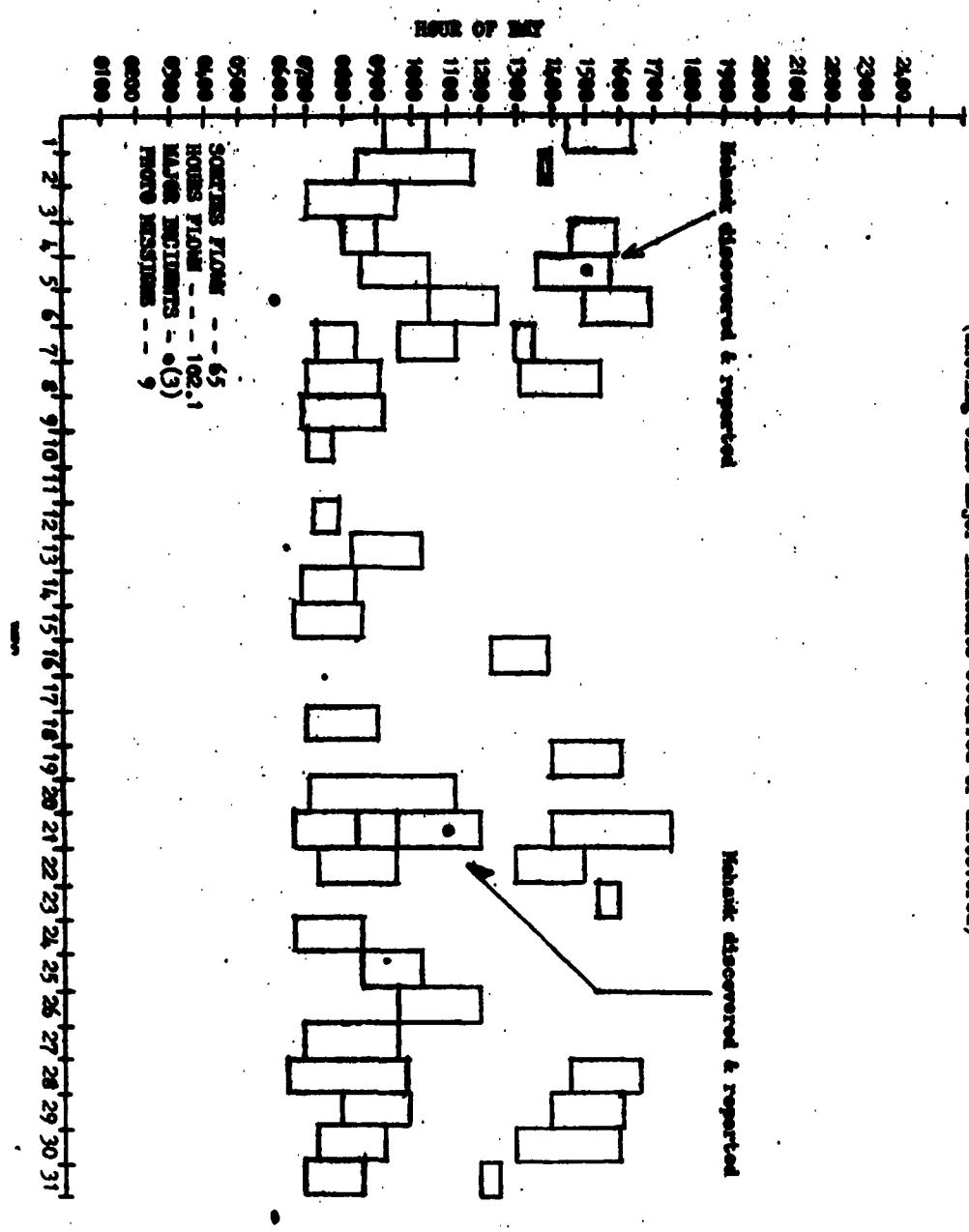

FIGURE B-2

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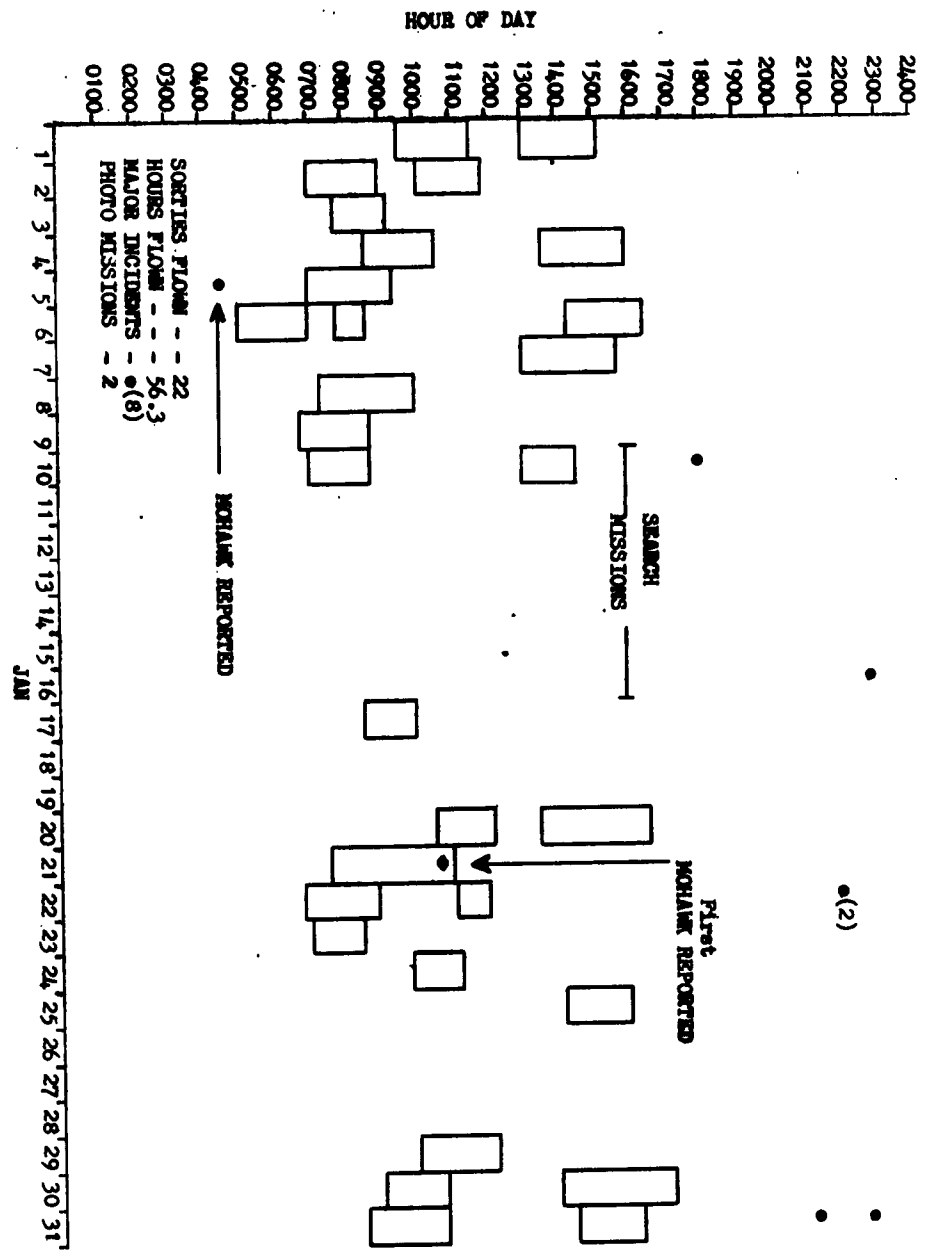

FIGURE B-3

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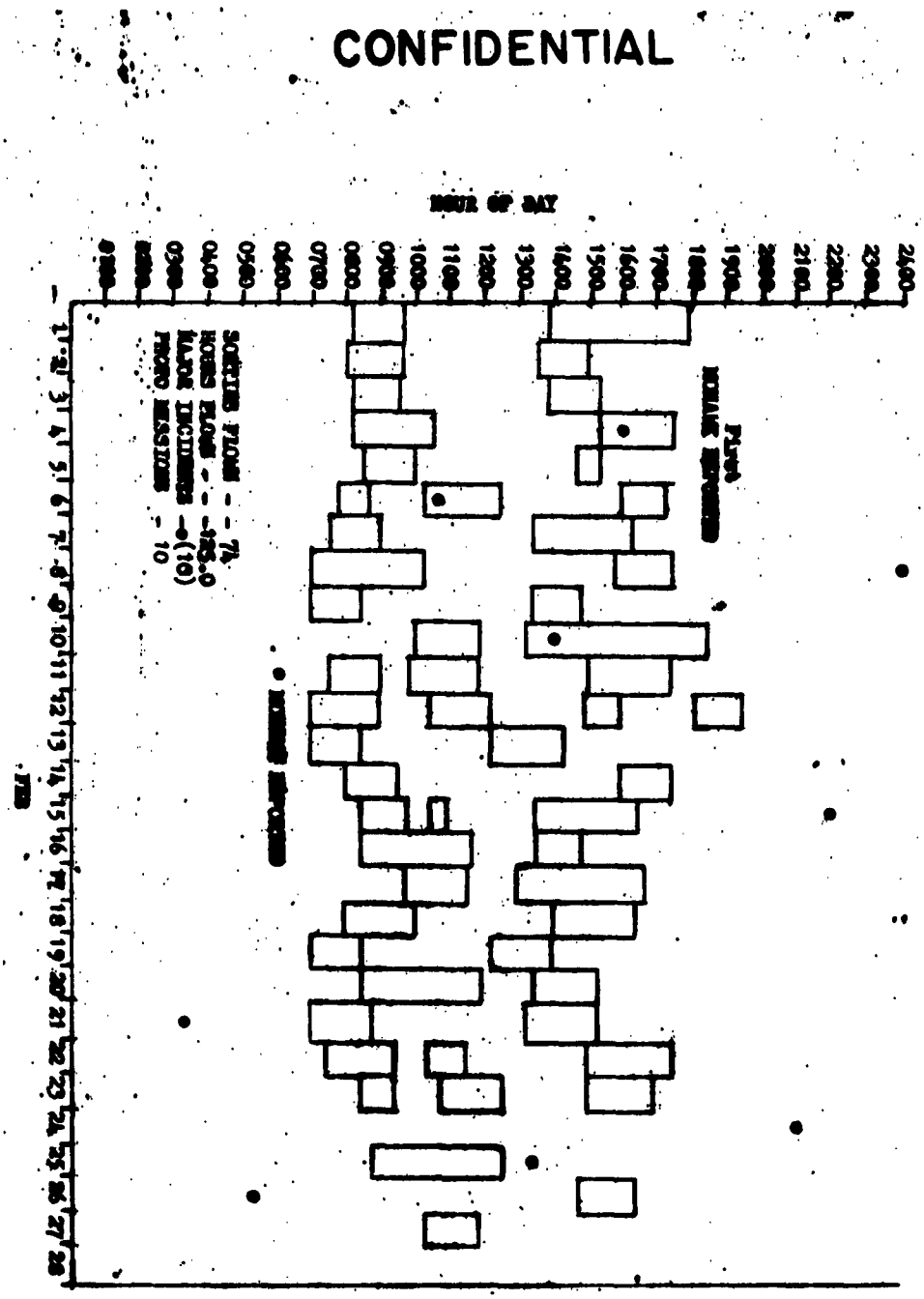

TABLE B-4

MOHAWK UTILIZATION STATISTICS

MONTHLY PERIODS	AVG NR ON HAND	ACFT FLYABLE	AVG % AVAIL	SORTIES FLOWN	HOURS FLOWN	AVERAGE HOURS PER DAY	AVERAGE HOURS PER ACFT ON HAND	AVERAGE HOURS PER FLYABLE ACFT	AVG SORTIES PER FLYABLE ACFT PER DAY	AVG SORTIE DURATION (HOURS)	AVG HOURS PER ACFT ON HAND PER MONTH (30 DAY)
16 Oct 15 Nov	6.0	3.16	52.68	230	332.3	10.72	1.79	3.39	2.35	1.44	53.58
16 Nov 15 Dec	5.13	4.40	85.70	231	373.1	12.44	2.42	2.83	1.75	1.615	72.66
16 Dec 15 Jan	4.81	4.39	91.28	254	457.1	14.75	3.07	3.36	1.87	1.80	92.04
16 Jan 15 Feb	4.90	4.23	86.17	252	400.7	12.93	2.64	3.06	1.92	1.59	79.08
16 Feb 15 Mar	5.99	4.61	76.80	313	604.3	21.59	3.60	4.69	2.43	1.93	107.94

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Appendix 2 to ANNEX B (continued)

TABLE B-5

AIRCRAFT HITS

AIRCRAFT	HIT	DATE	REMARKS
1	1	13 Nov 62	Right aileron from bottom to top. Only minor repair required.
1	2	13 Nov 62	Right front nose section, penetrating to beneath observer's seat. Several hydraulic lines and an electrical cable damaged. Minor repair required.
2	3	8 Dec 62	Right aileron. Minor repair.
2	4	8 Dec 62	Right entrance window locking mechanism. Round lodged in observer's seat back. Life raft pierced, oxygen hose cut, and pitot static port line damaged. Observer received minor leg wound.
3	5	9 Jan 63	Through both speed brakes from left to right. Damage to sheet metal panels and bulkhead. Minor repairs initially with permanent repairs at next periodic inspection.
4	6	12 Jan 63	Aft section of left engine nacelle. Minor sheet metal repair.
5	7	16 Feb 63	Right side of fuselage at speed brake. Major sheet metal repair with minor speed brake mechanism repair.
6	8	2 Mar 63	Leading edge of left wing inboard of #2 engine. Minor sheet metal repair.
7	9	3 Mar 63	Left side of cockpit under pilot's entrance window. Round penetrated a bulkhead and scattered rivets, some of which hit the overhead sun screen. Others lodged in pilot's pistol holster. Pilot received shrapnel wounds in left thigh. Major sheet metal repair. Oxygen hose damaged.
8	10	6 Mar 63	Leading edge of left outboard aileron. Minor repair.
9	11	12 Mar 63	Right main landing gear door. Round penetrated into wheel well. Minor repair.
*10	12	20 Mar 63	One blade of #2 propeller. Round penetrated through the blade. Major component change.
*11	13	23 Mar 63	Round penetrated left wing from bottom to top just forward of outboard aileron. Minor repair.
*11	14	23 Mar 63	Round penetrated right wing from bottom to top just inboard of #2 engine. Minor repair.

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Appendix 2 to ANNEX B

SUPPORTING DATA TO SECTION III, OBJECTIVE 2, SUITABILITY OF THE AIRCRAFT

Contents

Table B-4 - Mohawk utilisation statistics

Table B-5 - Aircraft hits

Figure B-5 - Location of aircraft hits - left side view

Figure B-6 - Location of aircraft hits - right side view

Figure B-7 - Location of aircraft hits - bottom view

ACTIV-AM
Final Test Report — Mohawk

Appendix 2 to ANNEX B (continued)

AIRCRAFT HITS

AIRCRAFT	HIT	DATE	REMARKS
*11	15	23 Mar 63	Round penetrated right wing from bottom to top just outboard of #2 engine. Minor repair.
*11	16	23 Mar 63	Round penetrated fuselage from bottom to top just aft of cockpit slanted bulkhead. Minor repair.

*Note: These hits occurred after the test period.

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Appendix 2 to ANNEX B (continued)

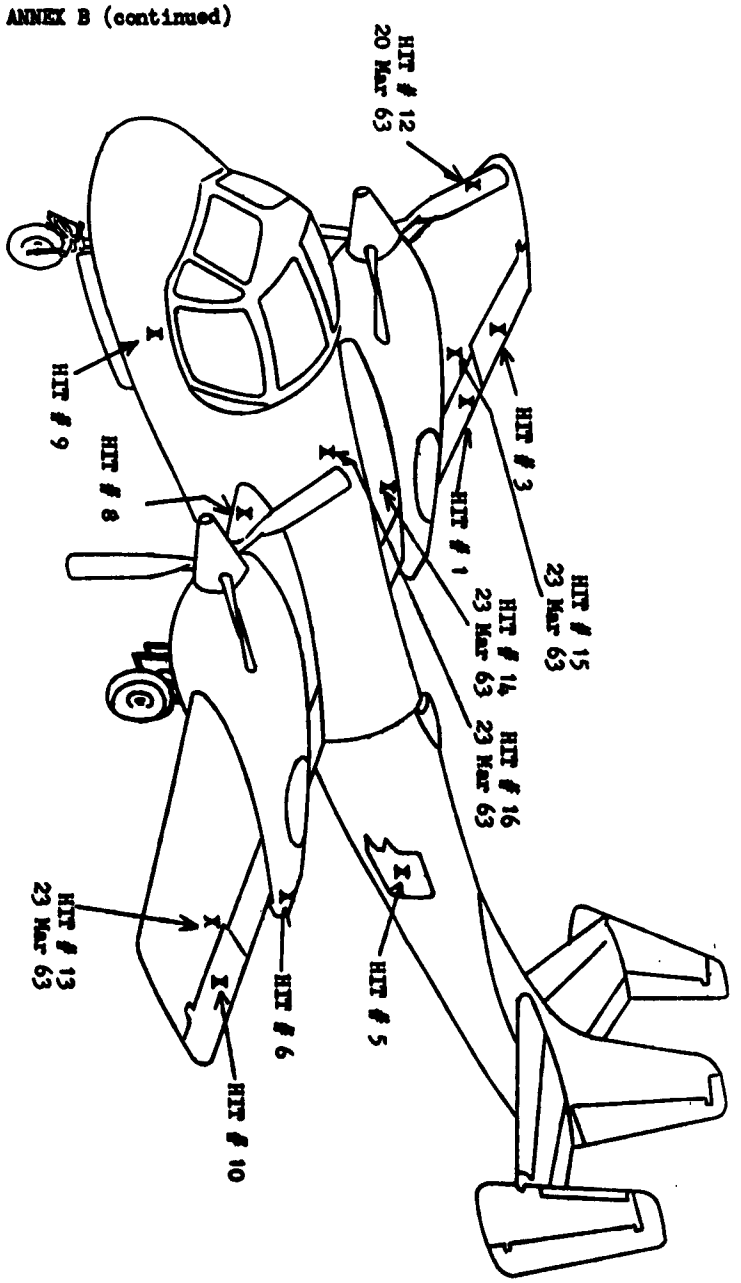

FIGURE B-5
LOCATION OF AIRCRAFT HITS
LEFT SIDE VIEW

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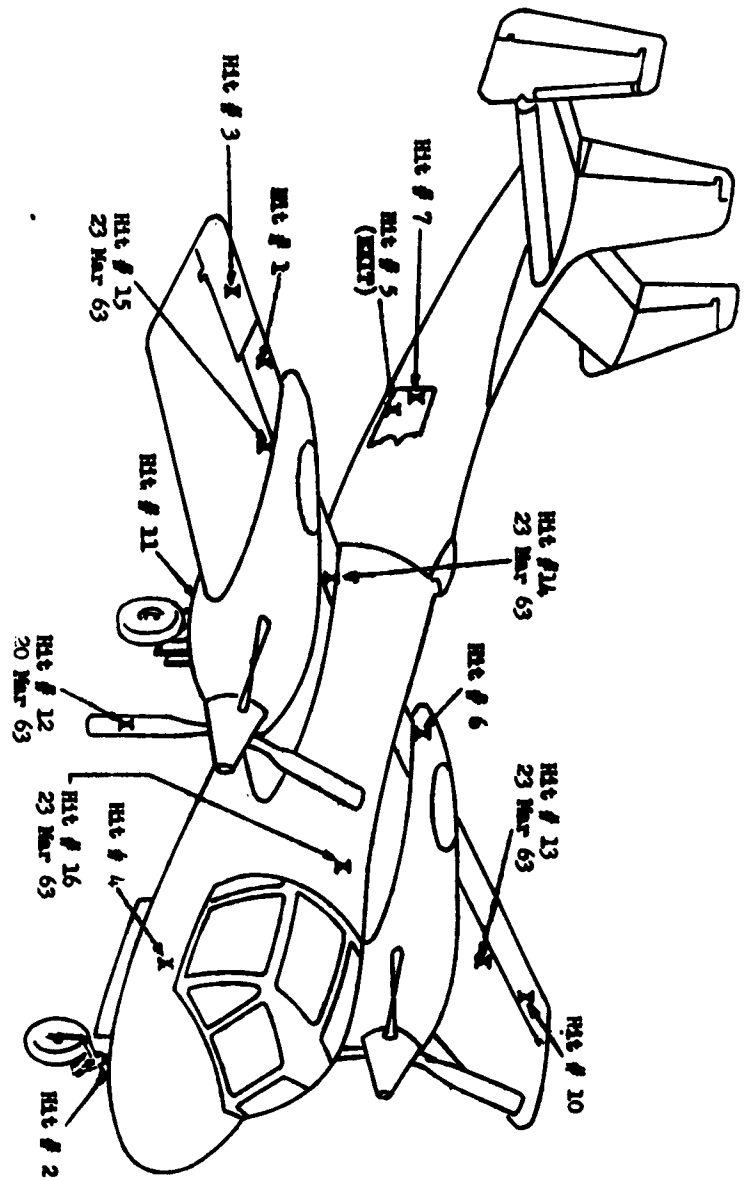

FIGURE B-6
LOCATION OF AIRCRAFT HITS
RIGHT SIDE VIEW

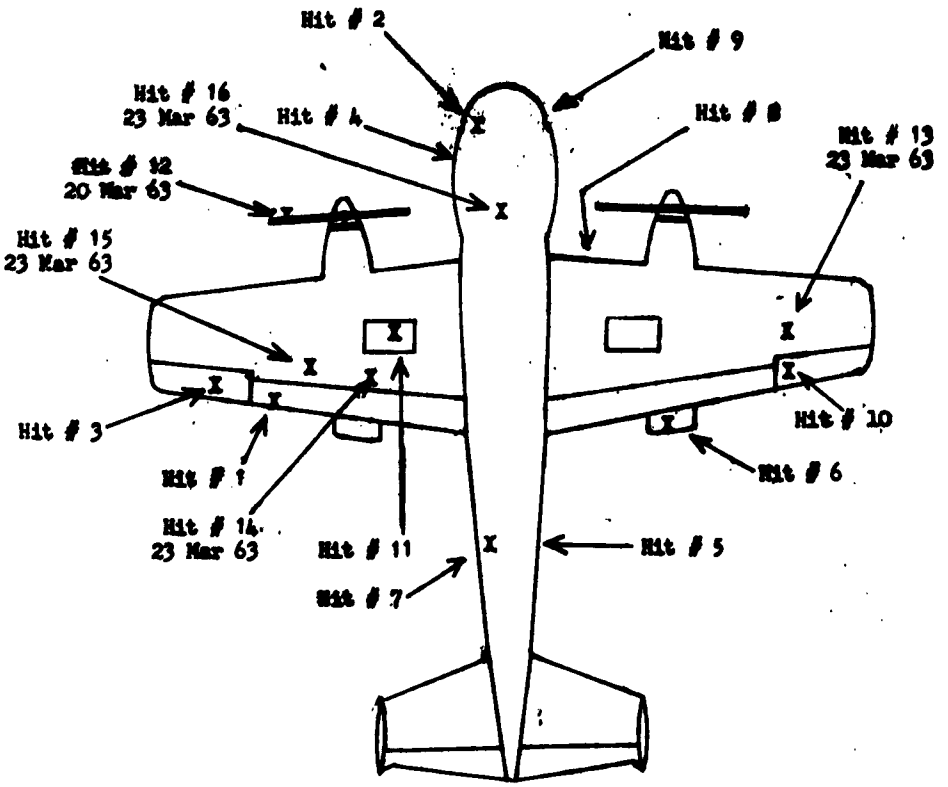

FIGURE B-7

LOCATION OF AIRCRAFT HITS

BOTTOM VIEW

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Appendix 3 to ANNEX B

SUPPORTING DATA TO SECTION VIII, OBJECTIVE 7, LOGISTICS PROBLEMS

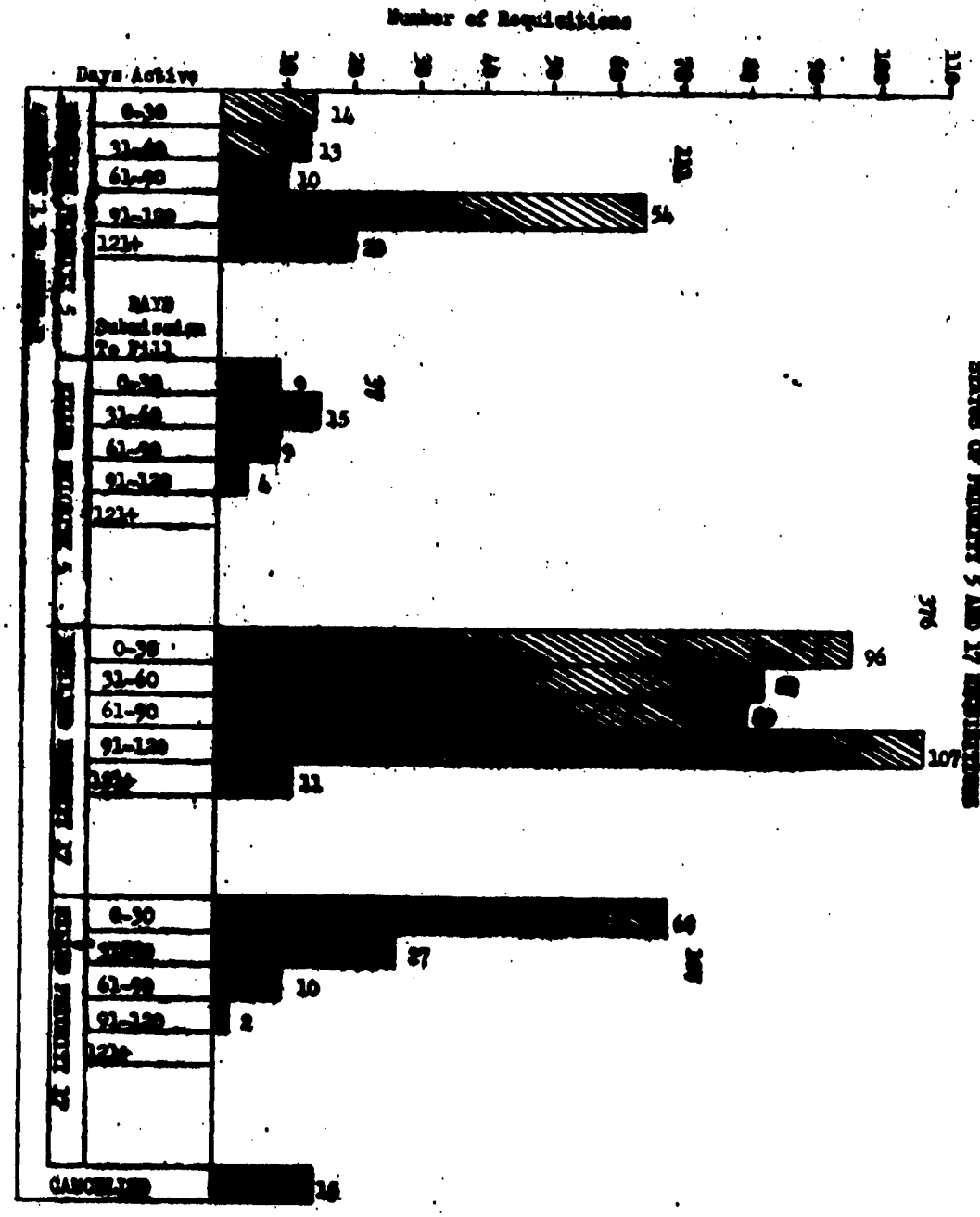
Contents

Figure B-8 - Status of Priority 5 and 17 Requisitions

Table B-6 - Usage of Selected Repair Parts

Figure B-9 - Aircraft Status and Availability

Figure B-10 - Aircraft Flight Hours


Number of Requisitions
Days Active
0-30
31-60
61-90
91-120
121+
14
13
10
54
28
0-30
31-60
61-90
91-120
121+
9
15
9
4
0-30
31-60
61-90
91-120
121+
96
107
11
0-30
31-60
61-90
91-120
121+
60
27
10
2
CANCELLED
16

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TAB B-3

TABLE B-6

USAGE OF SELECTED REPAIR PARTS

F.S.N.	NOMENCLATURE	AMOUNT
2935-772-5610	Oil Cooler	10
2620-772-6468	Tires, Main	47
2620-288-0247	Tires, Nose	8
1630-893-1102	Brake assemblies	7
1630-821-2697	Brake linings	828
1560-796-7074	Tank, oil	4
2915-784-5472	Fuel Boost Pumps	7
1650-775-3835	Hydraulic pumps	5
1650-772-0374	Main landing gear cylinders	6
1630-797-8608	Park brake valve	3
1650-776-1958	Speedbrake selector valve	2
2915-775-7814	Fuel controls	5
2840-712-0390	Engine	6
AN6235-1A	Fuel control filters	96
2915-970-8907	Fuel control filter kits	12
4330-227-3274	Oil filter	51
AN6235-4A	Hydraulic filter	60
1610-799-9020	Prop dome seal	41
2840-475-6965	Oil filter seal	90
2840-475-6966	Oil filter seal	90
2840-475-6967	Oil filter seal	99
5330-248-3835	Fuel control filter seals	90
5330-265-1091	Fuel control filter seals	96
5330-265-1088	Fuel control filter seals	94
1630-797-8604	Brake disc	8
6685-898-1744	EGT. Harness (Thermocouple)	7

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F.S.N.	NOMENCLATURE	AMOUNT
6685-778-8777	Tranamitter, hydraulic	4
6220-553-8892	Tachometer, generator	6
2840-778-2276	Nut, internal wrenching	18
2840-970-8908	Engine inspection kit	20
1560-445-6252	Rear view mirror	3
2840-739-6906	Reduction gear kit	1
1650-772-3424	Nose gear door actuator	3
1560-770-6012	Glass, windshield R/H	2
1560-774-5027	Glass, windshield L/H	2
2840-790-3648	Gear box	1
1610-671-1092	Prop control assy	4
1680-887-9183	Canopy actuator	2
2915-795-9852	Pump, rotary power driven	4
1005-300-5541	Gun, charger, H50-AE P/N 871134	3
	Harness assembly P/N 200-54185	2
	Release bomb rack, AERO 7B-1 DWG#60A12206	2
	Combination rack, bomb & rocket AERO 15C, DWG #58A154R1	1
	Combination rack, bomb AERO 65A	1
5841-543-1328	Control amplifier-APN-22	9
6720-893-4272	Photo system unit	3
6615-486-8072	Gyroscope, ASN-35	4
5831-682-2703	ICS control C-1611/A1C	8
6605-098-2703	Gyroscope (MA-1)	3
6760-753-5155	Lens cone LA130A	1
6760-753-5157	Lens cone LA131A	5
5895-681-9868	Control APX 44	1

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F.S.N.	NOMENCLATURE	AMOUNT
5955-577-7784	Crystal	1
6125-568-5821	Dynamotor DY 107/AR	2
6720-899-7911	Control panel (Camera)	1
5895-677-1882	RT 494/APX-44	3
6605-604-5662	Amplifier compass (MA-1)	1
5826-505-0645	CV-265/ARN-30A	2
5826-519-6963	R-1022/ARN-30D	2
5821-543-1890	RT-349/A ARC-55	3
5821-503-2586	AM/ARC-44	4
5826-519-6967	AM/ARN-59	1
5826-752-2508	PP-2792	4
5826-553-5924	AT-780	2
6125-542-6363	DY-150	1

Notes:

1. Since the test unit arrived in the Republic of Vietnam in September 1962, the six assigned JOV-1C aircraft have flown a total of 2336.6 hours.

2. Usage of selected TC air, Signal, and Ordnance repair parts is shown above. The majority of these are either high usage or high value items.

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TAB B-3

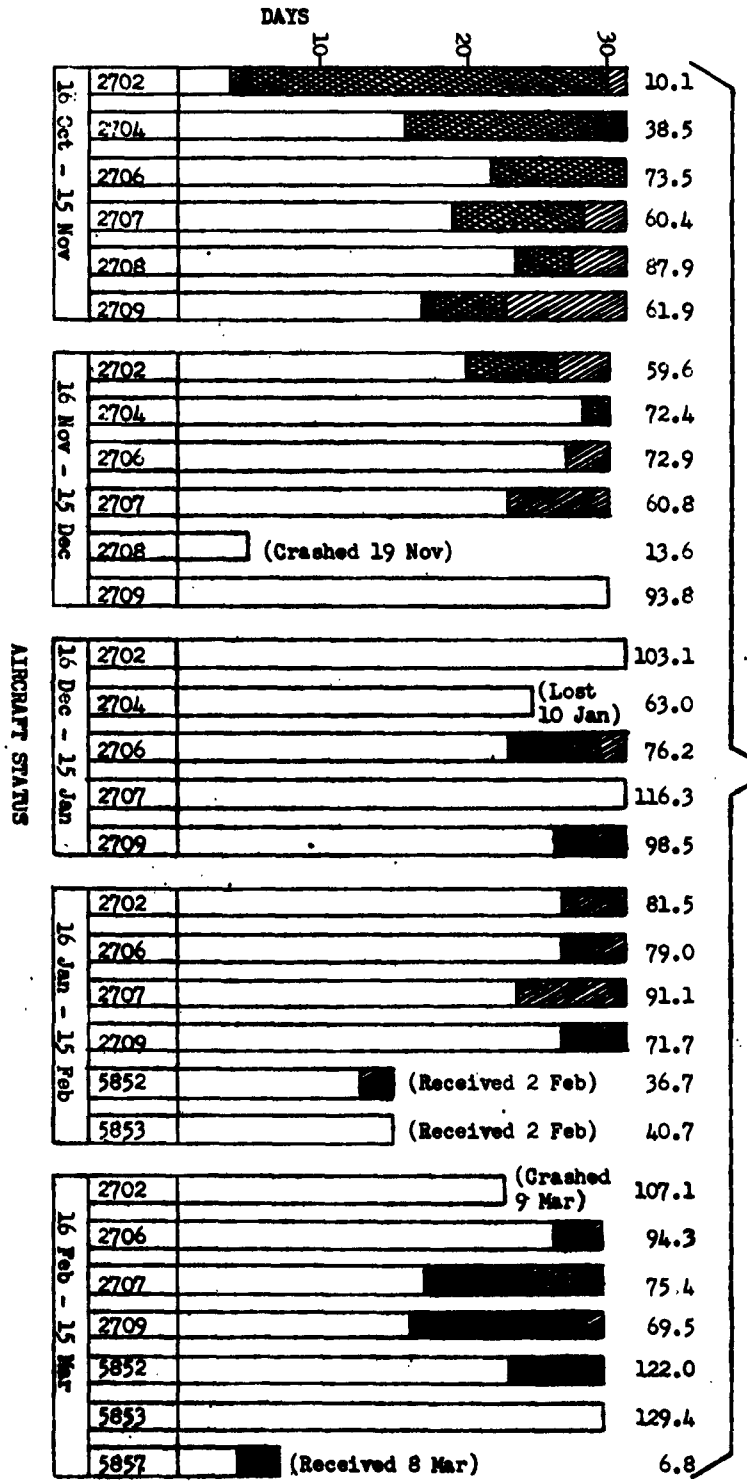

FIGURE B-9
AIRCRAFT STATUS AND AVAILABILITY

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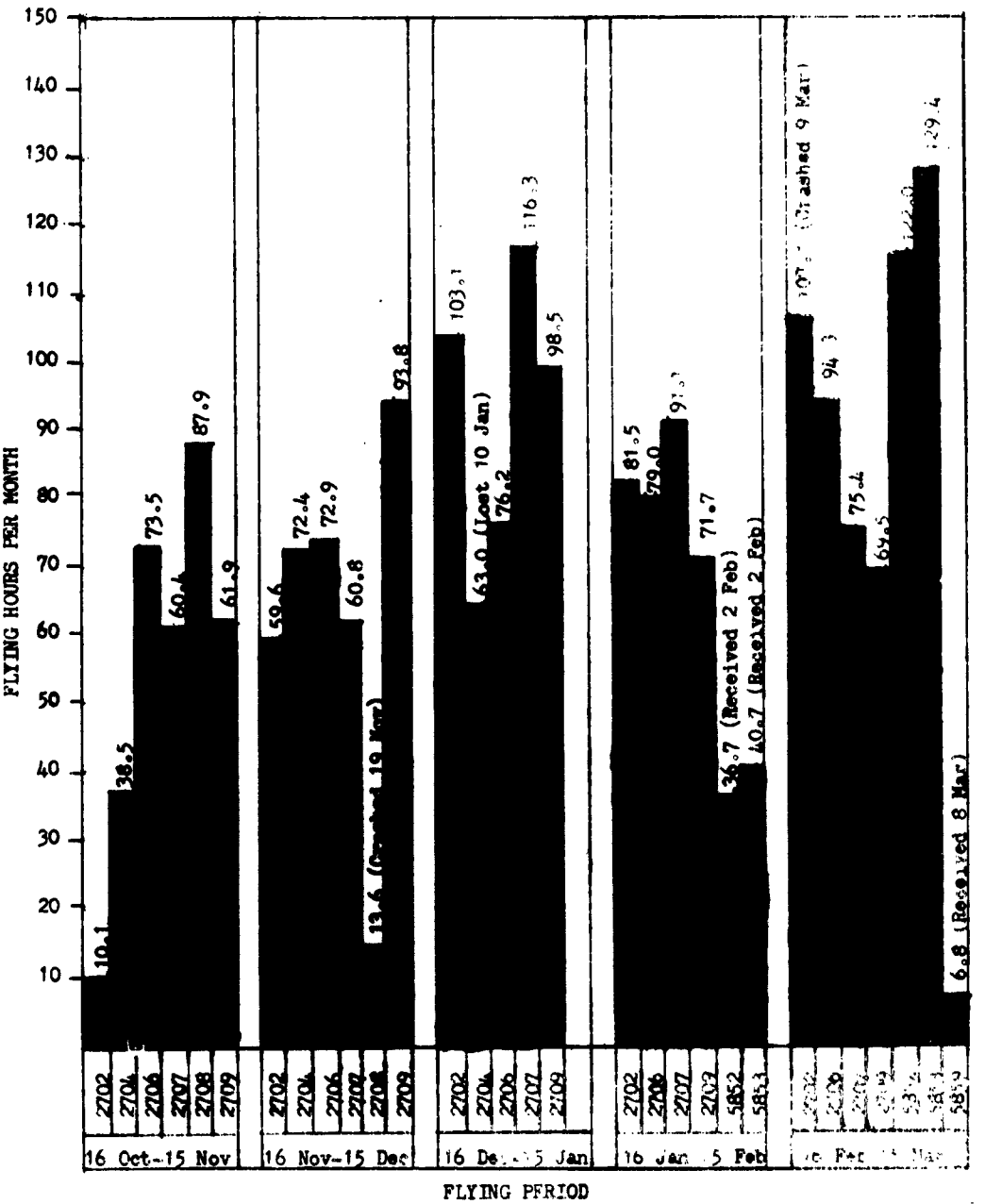
FIGURE B-10

AIRCRAFT FLIGHT HOURS

*-MONTHLY FLIGHT FACTOR PER AIRCRAFT IN ACTIVE COMBAT AREAS AS OUTLINED IN SB 1-1



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ANNEX C — Recommended Changes to TOE

1. Appendix 1 is the TOE of 23d SWAD with recommended changes for support of both ARVN and US forces conducting counter-insurgency operations. Recommended changes are based on the following factors:

a. The 23d SWAD operated as a separate detachment. It maintained all personnel and supply records and performed organizational maintenance for 32 motor vehicles.

b. The unit operated with two detached flight teams, one based approximately 100 miles and the other approximately 200 miles from the detachment headquarters and service elements.

c. Supported ARVN units lack an organic photo-processing capability.

d. The 23d SWAD is the only Mohawk unit in the theater of operations.

2. Recommended changes in the TOE to support US forces are based upon the following assumptions:

a. Decentralized employment of flight teams will continue to be the most effective means of providing support.

b. Supported units will have an organic photo-processing capability.

c. The 23d SWAD will be provided administrative and logistical support by an Army aviation battalion headquarters.

d. Field maintenance personnel and equipment will remain organic to the unit.

3. Appendix 2 is a detailed recommendation for an Aircraft Maintenance and Service Team.

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Final Test Report -- Mohawk

Appendix 1 to ANNEX C -- Recommended changes to TOE

The 23d SWAD is organized under TOE 31-500T, 14 Mar 62, as amended by Ltr Hq DA, Subject: "Activation of the 23d Special Warfare Aviation Detachment" dtd 18 Jul 62, plus teams CA and CB from TOE 29-500D, 21 Feb 58, w/C2 (TOE 300-21) (SRC 29-500D-8101).

Recommendations are shown for support of ARVN and US Forces as discussed in Section III G. Personnel recommended for addition but not currently authorized in the TOE are indicated by (*).

PERSONNEL

DUTY	MOS	GRADE	AUTH	RECOMMENDED ARVN	RECOMMENDED US	FOOTNOTE
Detachment Headquarters Team						
Detachment Commander	1983	Major	1	1	1	
*Supply Specialist	761	WO	0	1	1	#1
First Sergeant	717.80	E-8	1	1	1	
Supply Sergeant	768.60	E-6	1	1	1	
*Supply Clerk	768.10	E-4	0	1	1	#2
Personnel administrative specialist	716.10	E-4	1	1	0	#3
*Clerk Typist	711.10	E-4	0	1	1	#4
Light Truck Driver	670.00	E-3	1	0	0	#5
			5	7	6	
Flight Operations Team						
Operations Officer	1982	Capt	1	1	1	
Intelligence Officer	69301	Lt	1	1	1	
*Operations Sergeant	113.70	E-7	0	1	1	#6
Flight Operations Chief	907.60	E-6	1	0	0	#7
Senior Intelligence Specialist	113.30	E-5	1	1	1	
Intelligence Specialist	113.30	E-4	1	1	1	
Flight Operations Specialist	907.10	E-5	1	1	1	
			6	6	6	
Communications Team						
Communications Chief	311.60	E-6	1	1	1	
Team Chief	053.60	E-5	2	3	3	#8
Electronic Navigation Equipment Rpmn	284.20	E-5	2	2	2	
Senior Radio Repairman	296.10	E-5	1	1	1	
Surveillance Equipment Repairman	401.30	E-5	1	1	1	
*Surveillance Equipment Repairman	401.30	E-4	0	1	1	#9
Radio Repairman	296.10	E-4	1	1	1	
Radio Teletype Operator	053.10	E-4	2	3	3	#10
Signal Supply Parts Specialist	765.10	E-4	1	1	1	
Still Photographic Lab Specialist	843.10	E-4	2	6	2	#11
			13	20	16	
Flight Teams (3)						
Flight Team Leader	1980	Capt	1(3)	1(3)	1(3)	
Fixed wing Aviator	1980	Lt	3(9)	3(9)	3(9)	#12
Airplane Crew Chief	672.20	E-6	2(6)	2(6)	2(6)	
Senior Observation Airplane Mechanic	672.20	E-5	1(3)	1(3)	1(3)	
Observation Airplane Mechanic	672.20	E-4	2(6)	2(6)	2(6)	
Aviation Ordnance Specialist	424.20	E-5	1(3)	1(3)	1(3)	
Aviation Ordnance Specialist	421.10	E-4	1(3)	1(3)	1(3)	
			11(33)	11(33)	11(33)	

TAB C-1

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Appendix 1 to ANNEX C — Recommended changes to TOE (continued)

PERSONNEL

Maintenance & Service Team

DUTY	MOS	GRADE	AUTH	REMARKS
Maintenance Officer	6A823	Lt	1	See app-
Repair Foreman	679.70	E-7	1	endix 2
Fixed Wing Tech Inspector	679.40	E-6	1	to Annex
Light Truck Driver	670.00	E-3	1	C for Pro-
*Clerk Typist	711.10	E-4	0	posed auth
Parachute Rigger	464.10	E-4	2	
			6	

Field Maintenance Team

Aircraft Repair Technician	67100	CWO	1	See App-
Repair Foreman	679.60	E-6	1	endix 2
Machinist, precision	443.60	E-5	1	to Annex
Senior aircraft engine repairman	681.10	E-5	1	C for Pro-
Senior airframe repairman	686.10	E-5	1	posed auth
Senior airplane repairman	672.40	E-5	1	
Senior electrical repairman	685.10	E-5	1	
Senior rotor prop repairman	684.10	E-5	1	
Aircraft engine repairman	681.10	E-4	2	
Aircraft parts specialist	766.10	E-4	1	
Airframe repairman	686.10	E-4	2	
Airplane repairman	672.40	E-4	2	
Clerk Typist	711.10	E-4	1	
Electrical repairman	685.10	E-4	2	
Hydraulic system repairman	687.10	E-4	1	
Rotor prop repairman	684.10	E-4	1	
Small Arms repairman	421.10	E-4	1	
Aircraft parts specialist	760.00	E-3	1	
Small arms repairman helper	420.00	E-3	1	
Tool room keeper	680.00	E-3	1	
			24	

POL & Ord Team

	MOS	GRADE	AUTH	ARVN	US	FOOTNOTE
Aviation ordnance supervisor	424.60	E-6	1	1	1	
Ammunition storage specialist	411.20	E-4	2	1	1	#13
*Petrol storage supervisor	552.60	E-5	0	1	1	#14
Petrol storage specialist	552.10	E-4	4	4	4	
Aviation ordnance specialist	424.10	E-5	2	2	2	
Crash rescue team chief	525.60	E-5	1	1	1	
Crash rescue specialist	525.10	E-4	4	4	4	
			14	14	14	

Motor Maintenance Team

Motor Sergeant	631.60	E-5	1	1	1	#15
*Senior wheel vehicle mechanic	631.10	E-5	0	1	1	#16
Wheel vehicle mechanic	631.10	E-4	2	1	1	#17
*Engineer equipment repairman	624.10	E-4	0	2	2	#18
Wheel vehicle mechanic helper	630.00	E-3	1	1	1	
			4	6	6	

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Final Test Report -- Mohawk

Appendix 1 to ANNEX C -- Recommended changes to TOE (continued)

PERSONNEL

Mess Team

DUTY	MOS	GRADE	AUTH	ARVN	US	FOOTNOTE
Mess sergeant	941.60	E-6	1	1	1	
1st cook	941.10	E-5	2	2	2	
Cook	941.10	E-4	1	1	1	
Cooks helper	940.00	E-3	1	1	1	
			5	5	5	

Recapitulation

	Current	Proposed ARVN	Proposed US	REMARKS
Off	16	16	16	Totals reflected here includes recommended combination of maintenance and service teams shown in Appendix 2 to Annex C.
WO	1	1	1	
EM	93	104	99	
	110	121	116	

PERSONNEL FOOTNOTES

1. To supervise personnel and supply activities (See Section VI for discussion).
2. One supply sergeant inadequate.
3. Not required if personnel records are maintained by higher headquarters.
4. To perform company administration.
5. Not required.
6 & 7. MOS 113.7 more qualified to perform duties with 23d SWAD desireable to have MOS 907 training.
8. One per RTT.
9. To maintain surveillance equipment.
10. 1 per AN/GRC-26(1), 1 per AN/GRC-46(2).
11. To operate 3 ES-29 photo darkrooms. (See Section VI for discussion).
12. Recommended grade of Lt/Capt.
13. Only 1 required.
14. To supervise POL support.
15. Recommend E-6.
16 & 17. 1 E-5, 1 E-4.
18. To maintain ground support power equipment. (See Section VI for discussion).

EQUIPMENT

Detachment Headquarters Team

UNIT DESCRIPTION	RECOMMENDED AUTH	ARVN	US	REMARKS
Compresser, reciprocating power driven 3½CFM	2	2	2	
Decontaminating apparatus portable 1½ Qt	2	2	2	
Detector kit chemical agent VGH	1	1	1	
Bag water sterilizing cotton duck porous stitched seams 36GA	1	1	1	
Compass magnetic lensatic 1.58 in dia card	2	2	2	
Flashlight plastic right angle 2 cell miniature flange lamp waterproof	2	2	2	
Generator set Gas eng 1.5 KW CT 1PH 2 wire AC 120V skid mtd	1	0	0	
Light set gen illum 25 outlet	1	1	1	
Sprayer insect hand 2 gal cap	1	1	1	
Bayonet knife w/scabbard for 7.62 MM rifle	7	7	6	1 per indiv
Binocular 7X50 Military reticle	3	3	3	
Pistol auto cal .45	1	2	2	

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Appendix 1 to ANNEX C -- Recommended changes to TOE (continued)

Detachment Headquarters Team UNIT DESCRIPTION	AUTH	ARVN	RECOMMENDED US	REMARKS
Rifle 7.62 MM semiauto lt barrel	6	5	4	1 per EM
Trailer amphibious cargo ¼ ton 2-wheel	1	1	1	
Trailer tank water 1½ ton 2-wheel	1	1	1	
Truck cargo 2½ ton 6x6 LWB w/WN	1	1	1	
Truck utility ¼ ton 4x4	1	1	1	
Watch wrist grade II	2	2	2	
Barber kit w/case M-1944	1	1	1	
Burner assembly space heater	2*	2	2	
Case field office machine plywood	2	2	2	
Cook set field	1	1	1	
Desk field plywood 22 5/8 in W 25 7/8 in H 14 5/8 in Dp	1	1	1	
Heater space coal or oil 45000 BTU 18 5/8 in H 18 5/8 in Dia	2	2	2	
Goggles sun 2 plastic 1 colorless 1 polorized green	3	3	3	
Guidon nylon and wool bunting	1	1	1	
Panel marker aerial liaison nylon 5 ft long 2 ft wide	2	2	2	
Repair kit tentage	1	1	1	
Stove gasoline burner 1 burner 5500 BTU	1	1	1	
Table folding legs wood solid top wood legs 36L 24W 27 25/32 H	2	4	4	
Tool kit pioneer engr squad	1	1	1	
Tool kit armorer	2	0	0	See Ord Tm
Tent GP small w/cover, liner, pins, poles, vestibule	2	2	2	GP medium
Typewriter nonportable 14-15 in carriage	2	2	2	
Charger radiac detector PP-1578/PD	2	2	2	
Radiacmeter IM-93/UD	2	2	2	
Radiacmeter IM-108/PD	1	1	1	
Radio set AN/VRC-18 mtd in trk ¼ ton	1	1	1	
Computer air navigation dead reckoning type MB-4	1	1	1	
Plotter acft 1-500000 & 1-1000000	1	1	1	
Individual quick adj harness	4	0	0	Issued w/acft
Survival kits FSN 6545-611-0978	12	0	0	Trfd to flt tm
RECOMMENDED ADDITIONS				
Safe field, combination	0	1	1	
Suit integrated torso harness	0	1	1	Should be std item of issue 1 per aviator
Life preserver MK IIIC	0	1	1	Should be std item of issue 1 per aviator
Mask protective field	0	7	6	1 per indiv
Radio set AN/PRC-10	0	2	2	Hq afld scty
Generator, diesel 15 KW, 2-wheel, PU402	0	1	1	
Operations Team				
Decontaminating apparatus portable 1½ qt	2	2	2	
Compass magnetic lensatic 1.58 in dia card	1	1	1	
Flashlight plastic right angle 2 cell miniature flange lamp waterproof	2	2	2	
Flashlight plastic baton ty 2 cell miniature flange lamp waterproof	20	20	20	
Generator set gas eng 1.5 KW 2 wire DC 28V skid mtd	1	1	1	
Generator set gas eng 1.5 KW 60 cy 1 ph 2 wire AC 120V skid mtd	1	3	1	1 per light set

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Final Test Report -- Mohawk

Appendix 1 to ANNEX C -- Recommended changes to TOE (continued)

UNIT DESCRIPTION	AUTH	RECOMMENDED ARVN	US	REMARKS
Light set marker emergency airfield runway battery operated	1	3	3	1 for hq airfield, 2 for Division afld
Light set operat area aircraft 1½ afld runway	1	3	1	" " " " " " "
Bayonet knife w/scabbard for 7.62 MM rifle	6	6	6	
Pistol auto cal .45	2	2	2	
Rifle 7.62 MM semiauto lt barrel	4	4	4	
Trailer cargo 3/4 ton 2-wheel	1	1	1	
Trailer ¼ ton 2-wheel	1	1	1	
Trailer cargo 1½ ton 2-wheel	1	1	1	
Truck cargo 3/4 ton 4X4	1	1	1	
Truck van shop 2½ ton [redacted]	1	1	1	
Truck ¼ ton 4X4	1	1	1	
Antenna RC-292	1	1	1	
AN/PRC 25	2	2	2	
Watch wrist grade II	1	1	1	
Add-Sub machine hand 10key 8 digit stationary carriage	1	1	1	
Burner assembly space heater	1	1	1	
Case fld office machine plywood	2	2	2	
Clock message center	1	1	1	
Cook set field	1	1	1	
Desk plywood 19 3/8 in W 11¼ in H 14 5/8 in dp	1	1	1	
Heater space coal or oil 45000 BTU 18 5/8 in H 18 5/8 in dia	1	1	1	
Goggles sun 2 plastic 1 colorless 1 polorized green	3	3	3	
Stove gasoline burner 1 burner 5500 BTU	1	1	1	
Table folding legs wood solid top wood legs 36L 24W 27 25/32 H	3	3	3	
Tent GP small w/cover, liner, pins, poles, vestibule	1	1	1	
Typewriter nonportable 14-15 in carriage	1	2	2	1 per intel opns sect
Radio set AN/GRC-5 mtd in trk shop van	1	1	1	
Radio set AN/VRC-10 mtd in trk 3/4 ton cargo	1	1	1	
Radio set AN/VRC-18	1	1	1	
Radio set AN/VRC-24	1	1	1	
Wind measuring set AN/PMQ-3	1	1	1	
Chain assy sgl let w/pear links and 1 grab hook 5/8 in by 16 ft	1	1	1	
Computer air navigation dead reckoning ty MB-4	2	2	2	
Plotter aircraft scale 1-500000 & 1-1000000	2	2	2	
RECOMMENDED ADDITIONS				
Mimeograph machine	0	1	1	
Safe 4 drawer combination	0	1	1	
Suit integrated torso harness	0	2	2	should be item of issue, 1 per aviator
Life preserver MK IIIC	0	2	2	" " " " " " "
Mask protective field	0	6	6	1 per indiv
Kit interpretation photo type F-3	0	1	1	
Mast AB-577( )G	0	2	2	for use w/radio
M-60 machine gun, 7.62 MM	0	1	1	

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Appendix 1 to ANNEX C -- Recommended changes to TOE (continued)

Communications Team UNIT DESCRIPTION	RECOMMENDED AUTH	ARVN	US	REMARKS
Decontaminating apparatus portable 1½ qt	5	5	5	
Flashlight plastic right angle 2 cell miniature flange lamp waterproof	2	5	5	
Generator set gas eng 3KW DC 28V skid shock mtd	2	2	2	
Bayonet knife w/scabbard for 7.62 MM rifle	13	20	16	1 per indiv
Repair shop signal corps truck mtd 2½ ton 6X6	1	1	1	
Rifle 7.622 MM semiauto lt barrel	13	20	16	1 per indiv
Truck cargo 3/4 ton 4X4	3	3	3	
Trailer cargo 3/4 ton 2-wheel	3	3	3	
Truck cargo 2½ ton 6X6 LWB	2	3	3	to carry AN/GRC-26D
Burner assembly space heater	1	1	1	
Case field office machine plywood	1	1	1	
Cook set field	2	2	2	
Heater space coal or oil 45000 BTU 18 5/8 in H 18 5/8 in dia	1	1	1	
Goggles sun 2 plastic 1 colorless 1 polorized green	5	5	5	
Safe 26 in H 17 in W 17½ in dp	2	1	1	
Stove gas burner 1 burner 5500 BTU	2	1	1	
Table folding legs wood solid top wood legs 36L 24W 27 25/32 H	2	2	2	
Tent GP small w/cover, liner, pins, poles, vestibule	1	1	1	
Typewriter nonportable 14-15 in carriage	1	1	1	
Reeling machine cable hand RL-27	1	1	1	
Darkroom photographic ES-29	1	3	1	(See Section VI for discussion)
Electronic teletypewriter security equip TSec/KW-7	2	3	3	1 per RTT
Frequency meter AN/URM-32	1	0	0	
Generator set gas eng trailer mtd PU-290/MR	1	4	2	1 per darkroom ES-29 1 per AN/MSM-16
Generator set diesel engine trailer mtd PU-402/M	1	1	1	
Antenna RC-292	1	1	1	
KA-30A	8	9	9	Auth 1 per Acft plus 50% spares
SWBD SB-22	2	2	2	
Indicator standing wave ratio AN/URM-120	1	0	0	
Multimeter ME-26/U	1	0	0	
Modification kit electronic equip MK-345/GR	1	0	0	
Oscilloscope OS-8/U	1	0	0	
Power supply PP 1104/G	1	1	1	
Radio set AN/VRC-18 mtd in trk 3/4 ton cargo	1	1	1	
Radio teletypewriter set AN/GRC-46	2	2	2	
Reeling machine cable hand RL-31	1	1	1	
Generator signal AN/URM-25	1	0	0	
Telephone set TA-312/PT	6	6	6	
Test set electron tube TV-7/U	1	0	0	
Tool kit radio repairman and tool equipment TK-115/U	2	1	1	
Radar and radio repair kit TK-87/U	2	2	2	
Tool kit photographic repair TK-77/GF	1	2	2	
Inverter vibrator PP-66/U	1	1	1	
Wire WD-1/TT RL-159/U	10	5	5	
Chain assy sgl leg w/pear links and 1 grab hook 5/8in by 16 ft	1	1	1	

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Appendix 1 to ANNEX C -- Recommended changes to TOE (continued)

Equipment to be transfered from Fld Maint Team

UNIT DESCRIPTION	AUTH	ARVN	US	REMARKS
Maintenance kit electronic equip MK-426/ARN	0	1	1	
Maintenance kit electronic equip MK-427/ARC	0	1	1	
Test set AN/ARM-51	0	1	1	
RECOMMENDED ADDITIONS				
Radio set AN/GRC-26D	0	1	1	(See Section VI for discussion)
Antenna AN/GRA-12	0	2	2	use w/AN/GRC-26D
LS-4 photo test set	0	1	1	rqd to test KS-61 camera equip
Mask protective field	0	21	16	1 per indiv
Photographic film processing machine (EH-3(1))	0	1	0	expedite film processing
Lens cone gp size 3"	0	9	9	spares reqd
Lens cone gp size 6"	0	9	9	spares reqd
Multimeter ST-352/U	0	1	1	
Flight Teams (3)				
Decontaminating apparatus portable 1½ qt	1	1	1	
Compass magnetic lensatic 1.58 in dia card	6	12	12	1 per aviator w/flt tm
Flashlight plastic right angle 2 cell miniature flange lamp waterproof	6	6	6	
Bayonet knife w/scabbard for 7.62 MM rifle	33	33	33	
Pistol auto cal .45	12	12	12	
Rifle 7.62 MM semiauto lt barrel	21	21	21	
Trailer cargo 3/4 ton 2-wheel	3	3	3	
Truck cargo 3/4 ton 4X4	3	3	3	
Watch wrist grade II	3	12	12	1 per aviator w/flt tm
Burner assembly heater	3	3	3	
Cook set field	3	3	3	
Heater space coal or oil 45000 BTU 18 5/8 in H 18 5/8 in dia	3	3	3	
Goggles sun 2 plastic 1 colorless 1 polorized green	3	3	3	
Stove gas burner 1 burner 5500 BTU	3	3	3	
Tent GP small w/cover, liner, pins, poles, vestibule	3	3	3	
Radio set AN/URC-10, URC-4 I.L.O.	6	6	6	
Radio set AN/VRC-10 mtd in trk 3/4 ton cargo	3	3	3	
Airplane observation medium	6	6	6	
Computer air navigation dead reckoning ty MB-4	12	12	12	
Life preserver set vest Mark 2	12	0	0	Substitute MK IIIC
Plotter aircraft scale 1-500000 & 1-1000000	12	12	12	
Tool kit aircraft mechanics general	15	15	15	
Douglas bomb hoist	6	0	0	not rqd if ord trlr avail
Ordnance trailer MK7	6	6	6	
Oxygen cart w/tanks	3	3	3	
Mult sev unit MA-1	3	0	0	replaced by recommended additions

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Appendix 1 to ANNEX C -- Recommended changes to TOE (continued)

UNIT DESCRIPTION	AUTH	RECOMMENDED ARVN	US	REMARKS
Bomb lift sling	6	0	0	not required if ord trlr avail
RECOMMENDED ADDITIONS				
Truck, utility ¼ ton 4X4	0	3	3	See Annex E for discussion
Trailer, cargo ¼ ton 2-wheel	0	3	3	See Annex E for discussion
Suit, integrated torso harness	0	12	12	should be standard item of issue
Life preserver, MK IIIC	0	12	12	should be standard item of issue
Mask protective field	0	33	33	1 per indiv
Stereoscope 2.25X pocket	0	3	3	1 per flt tm
Dispensing pump, hand piston 15 GPM w/20 ft hose	0	3	3	1 per flt tm emerg refuel
Extinguisher, fire, hand charged 15 lb	0	3	3	1 per flt tm
Adapter, assy MG pod cal.50, Grumman drawing Nr EO4134-28025	0	24	24	rqd for 50 cal pod assy, 4 per acft
Kit, armament control, Aero 1A part Nr 200-89045	0	24	24	rqd for auth armament of acft, 4 per acft
Radio set AN/VRC-24 mtd in ¼ ton truck	0	3	3	ANNEX E
Survival kit FSN 6545-611-0978	0	12	12	should be included w/ejection seat not separate item of equip
5120-540-2343 Jack hydraulic, 5 ton, 5½" closed	0	3	3	1 per flt tm
5120-203-4697 Jack hydraulic, 10 ton, 8" closed	0	3	3	1 per flt tm
TM 55-405-8 (Nov 61) p-42 par 48 electric driven compressor, 27½ volt	0	3	3	1 per flt tm
TM 55-405-8 (Nov 61) p-21 par 40, 2 wheel aux power unit	0	3	3	1 per flt tm
1730-048-7577 Maint platform (SM 55-4-1730-501)(30 Mar 62)	0	6	6	2 per flt tm
1730-792-9061 adapter, nose wheel	0	3	3	1 per flt tm
4910-580-9750 hydraulic bleeder pot hydrometer battery	0	3	3	1 per flt tm
6140-424-9707 syringe & battery jar 6140-635-3824	0	3	3	1 per flt tm
4830-268-9614 gun, grease, w/12" flex hose, hand oprtd	0	3	3	1 per flt tm
1730-294-3031 universal tow tow bar, aircraft	0	3	3	1 per flt tm
Maintenance and Service Team (See Incl 1)				
Decontaminating apparatus portable 1½ qt	2			
Flashlight plastic right angle 2 cell miniature flange lamp waterproof	1			
Bayonet knife w/scabbard for 7.62 MM rifle	6			
Pistol auto cal .45	1			
Rifle 7.62 MM semiauto lt barrel	5			
Trailer cargo 3/4 ton 2-wheel	1			

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Appendix 1 to ANNEX C -- Recommended changes to TOE (continued)

UNIT DESCRIPTION	AUTH
Trailer cargo 1½ ton 2-Wheel	1
Truck cargo 3/4 ton 4X4	1
Truck cargo 2½ ton 6X6 LWB w/WN	1
Watch wrist grade II	2
Burner assembly space heater	1
Cook set field	1
Heater space coal or oil 45000 BTU 18 5/8 in H 18 5/8 in dia	1
Goggles sun 2 plastic 1 colorless 1 polorized green	2
Stove gas burner 1 burner 5500 BTU	1
Tent GP small w/cover, liner, pins, poles, vestibule	1
Computer air navigation dead reckoning type MB-4	1
Plotter aircraft scale 1 to 500000 and 1 to 1000000	1
Tool kit acft inspection technical	1
Tool set org-maint army acft set A	1
Tool set org-maint army acft set A supplement	1

Aircraft Field Maintenance Team (See Incl 1)

Decontaminating apparatus portable 1½ qt	7
Compass magnetic lensatic 1.58 in dia card	1
Extinguisher fire, hand charged 15 lb	6
Flashlight plastic right angle 2 cell miniature flange lamp waterproof	2
Generator set gas eng 1.5 KW 60 cy 1 ph 2 wire AC 120V skid mtd	1
Light set gen illum 25 outlet	1
Bayonet knife w/scabbard for 7.62 MM rifle	24
Pistol auto cal .45	1
Rifle 7.62 MM semiauto lt barrel	23
Semitrailer van cargo 6 ton 2-wheel	2
Shop field maintenance spare parts storage set nr 2	1
Tool kit SA repairman	2
Truck cargo 3/4 ton 4X4	1
Truck cargo 2½ ton 6X6 LWB w/WN	1
Truck tractor 2½ ton 6X6 LWB w/WN	2
Truck tractor 5-ton 6X6 SWB	1
Truck wrecker med 5 ton w/winch	1
Watch wrist grade II	1
Case field office machine plywood	1
Cook set field	6
Heater duct type portable gasoline engine	1
Goggles sun 2 plastic 1 colorless 1 polorized green	7
Stove gas burner 1 burner 5500 BTU	6
Table folding legs wood solid tope wood legs 36L 24W 27 25/32 H	1
Tent maint frame type with liner frame pins	1
Typewriter nonportable 14-15 in carriage	1
Generator set gas eng trailer mtd PU 290/MR	2
Maintenance kit electronic equipment MK-426/ARN	1
Maintenance kit electronic equipment MK-427/ARC	1
Test set AN/ARM-51	1
Shop set acft maint trl mtd to crib elec flaw det	1
Shop set acft maint stlr mtd-A-2 sheet metal welding hydraulic	1

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Appendix 1 to ANNEX C -- Recommended changes to TOE (continued)

UNIT DESCRIPTION	AUTH
Shop set acft maint stlr mtd B-4 machine and eng shop	1
Shop set grd hldg and servicing fld maint army acft set A	1
Tool kit airframe repairmans army acft	3
Tool kit electrical repairmans army acft	3
Tool kit engine and power train repairmans	2
Tool kit propeller and rotor repairmans	2
Tool kit hydraulic repairmans army acft	1

POL and Ordnance Team

UNIT DESCRIPTION	AUTH	RECOMMENDED ARVN	RECOMMENDED US	REMARKS
Decontaminating apparatus portable 1½ qt	6	6	6	
Filter separator liq fuel 50 GPM 75 PSI 2 in inlet 2 in outlet	1	0	0	not rqd if issued recommended tanker set
Flashlight plastic right angle 2 cell miniature flange lamp waterproof	1	1	1	
Flashlight baton ty 2 cell miniature flange lamp waterproof	6	6	6	
Fire fighting equipment set trk mtd CL1500	1	1	1	
Bayonet knife w/scabbard for 7.62 MM rifle	14	14	14	1 per indiv
Rifle 7.62 MM semiauto lt barrel	14	14	14	1 per EM
Trailer cargo 2½ ton 2-wheel	3	3	3	
Truck cargo 2½ ton 6X6 LWB w/WN	3	3	3	
Truck tank fuel servicing 2½ ton 6X6	4	4	4	
Forced entry and rescue equip set aircraft crash	1	1	1	
Burner assembly space heater	1	1	1	
Control pressure filling non-vented drum 5 PSI pressure shut off	1	1	1	
Cook set field	1	1	1	
Drum fabric collapsible rayon tire cord coated 500 gal cap	4	0	0	not rqd if replaced by rcmd'd tank
Heater space coal or oil 45000 BTU 18 5/8 in H 18 5/8 dia	1	1	1	
Goggles sun 2 plastic 1 colorless 1 polorized green	5	5	5	
Pumping assy flammable liquid bulk transfer 225 GPM	1	0	0	not rqd if replaced by rcmd'd pump
Stove gasoline burner 1 burner 5500 BTU	1	1	1	
Tent GP small w/cover, liner, pins, poles, vestibule	1	4	4	GP medium
Trk lift fork gas 6000 lb pneu tire rough terrain	2	2	2	
Chain assy sgl leg w/pear links and 1 grab hook	4	4	4	
Filter separator liquid fuel for trk tnk fuel ser	4	0	0	not rqd see rcmd'd add
Nozzel single pt 2½" FSN 4730-289-0096 ft #6409	4	4	4	
RECOMMENDED ADDITIONS				
Tank and pump unit, liquid dispensing, for trk mounting consisting of one 50 GPM pump, two 600 gal alum tanks with water separator and hose	0	3	3	one per flt tm
Tank, fabric collapsible for pet products 3000 gal	0	3	3	one per flt tm

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Appendix 1 to ANNEX C -- Recommended changes to TOE (continued)

UNIT DESCRIPTION	AUTH	RECOMMENDED ARVN	US	REMARKS
Pump centrifugal, petroleum, gasoline drive, 350 GPM	0	1	1	replace items on current TOE
Filter separator, portable, skid mtd, qualified MIL-F-8508	0	1	1	replace items on current TOE
Tool kit, S/A rpmn	0	1	1	rqd to repair indiv wpns & ord
Tool kit, Armorers	0	3	3	rqd to repair indiv wpns & ord
Switching unit, rocket launcher tng, SWV-7/A37	0	30	30	5 per acft
Mask, protective field	0	17	17	1 per indiv
Dispensing pump hand piston 15 GPM w/20 ft hose	0	1	1	more effective pump
Multimeter AN/URM-105	0	1	1	
Motor Maintenance Team				
Decontaminating apparatus portable 1½ qt	1	1	1	
Flashlight plastic right angle 2 cell miniature flange lamp waterproof	1	1	1	
Bayonet knife w/scabbard 7.62 MM rifle	4	6	6	1 per indiv
Rifle 7.62 MM semiauto lt barrel	4	6	6	1 per indiv
Tool kit org maint nr 1 common	1	1	1	
Trailer cargo 1½ ton 2-wheel	1	1	1	
Truck cargo 2½ ton 6X6 LWB w/WN	1	1	1	
Burner assembly space heater	1	1	1	
Cabinet spare parts steel eleven drawers 39 in H 46 3/4 in W 23 9/16 in dp	1	0	0	not required
Cook set field	1	1	1	
Heater space coal or oil 45000 BTU 18 5/8 in H 18 5/8 in dia	1	1	1	
Goggles sun 2 plastic 1 colorless 1 polorized green	1	1	1	
Stove gas burner 1 burner 5500 BTU	1	1	1	
Tool kit automotive maintenance	3	3	3	
Tent GP small w/cover, liner, poles, pins, vestibule	1	1	1	GP medium
RECOMMENDED ADDITIONS				
Mask protective field	0	6	6	1 per indiv
Chain assy V-link X 16 W grab hook each end	0	1	1	used w/wrecker
Tool set, org maint (2d echelon) Nr 1 supplemental	0	1	1	supplement to Nr 1 common set
Unit Mess Team				
Mask protective field	4	4	4	
Ax single bit 4 lb 36 in long	1	1	1	
Mattock pick w/handle 5 lb	1	1	1	
Shovel hand round point D-handle Nr 2 open back	1	1	1	
Rifle 7.62 MM selective auto semiauto lt barrel	4	4	4	
Trailer tank water 1½ ton 2-wheel	2	2	2	
Truck cargo 2½ ton 6X6 LWB	1	1	1	
Bag canvas water sterlizing porous complete with suspension ropes and cover	3	3	3	

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Appendix 1 to ANNEX C -- Recommended changes to TOE (continued)

UNIT DESCRIPTION	RECOMMENDED AUTH	ARVN	US	REMARKS
Bucket gen purpose metal galv Hv wght w/o lip 14 qt	6	6	6	
Can corr rest galv w/cover 10 gal	8	8	8	
Can corr rest galv w/cover 32 gal	8	8	8	
Can gasoline 5 gal cap	10	10	10	
Clock alarm	1	1	1	
Goggles M-1944	1	1	1	
Heater immersion type for can corrugated	1	1	1	
Heater immersion type for trailer	1	1	1	
Lantern gasoline leaded fuel	1	1	1	
Range field A pack	3	3	3	
Range field B pack	3	3	3	
Tent kitchen fly proof comp w/pins-poles	1	1	1	
Tube flexible nozzle	5	5	5	
Flashlight MK-991/U	2	2	2	
Mess augmentation				
Mask protective field	1	1	1	
Rifle 7.62 MM selective semiauto lt barrel	1	1	1	
Flashlight MK-991-U	1	1	1	
RECOMMENDED ADDITIONS				
Bayonet knife w/scabbard for 7.62 MM rifle	0	5	5	1 per indiv
Extinguisher fire hand charged 15 lb	0	1	1	for use in kitchen
Burner, unit gas field range	0	6	6	rqd w/ranges

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Appendix 2 to ANNEX C -- Recommended aircraft maintenance and service team.

With field maintenance capability organic to the TOE, the concept of personnel employment and physical operation changes from the normal relationship between an organization and its supporting field maintenance unit. It is not envisioned that, where field maintenance capability is organic, organizational personnel will do just first and second echelon work, while field maintenance personnel do only third echelon work. Rather, the maintenance operation would be a combined effort with first through third echelon work being accomplished jointly. Lower skill level personnel have an opportunity to get on-the-job training in field maintenance procedures. Field maintenance personnel are expected to accomplish any required first through third echelon work.

The maintenance effort, as practiced by the 23d SWAD personnel, is aimed primarily at providing back-up support for the three flight teams. All major repairs and inspections are accomplished by a maintenance team at the home base of operations. When the flight teams are decentralized, organizational maintenance personnel are sent as an integral part of the teams to perform routine 1st and 2nd echelon work and minor repairs.

Based on over five months of centralized and decentralized employment it is felt that a more efficient maintenance effort could be realized by a change to the attached maintenance structure of the [illegible]wing is a recommended change, which combines the present Maintenance and Service Team and the Field Maintenance Team into one team. This combination eliminates the need for the warrant officer (aircraft repair technician -671C) and one repair foreman (E-7) presently authorized. Other personnel deletions are recommended, but will not be commented on.

Several personnel additions are recommended. Because of the frequency of periodic inspections, engine hot-end inspections, and associated work, one additional fixed wing inspector is required to provide adequate quality and safety of flight inspection of maintenance performed. Also, because of the frequency of engine inspections and propeller removals, one additional engine repairman and one propeller and rotor repairman are required. When the operation is decentralized, flight team maintenance personnel would not normally return to the home base while major work is being performed on the aircraft. Therefore, one additional airplane repairman is required.

MAINTENANCE AND SERVICE TEAM (RECOMMENDED)

DUTY	MOS	GRADE	ARVN	US	REMARKS
Aircraft Maintenance Officer	64823	Capt	1	1	
Repair Foreman	679.70	E-7	1		
Fixed Wing Inspector	679.40	E-6	2		
Shop Clerk	711.10	E-4	1	1	
Parachute Rigger	464.10	E-4	2	2	
Light Truck Driver	670.00	E-3	1	1	
Machinist, precision	443.10	E-5	1	1	
Sr Aircraft Engine Repairman	681.10	E-5	1	1	
Sr Airplane Repairman	672.40	E-5	1	1	
Sr Airframe Repairman	686.10	E-5	1	1	
Sr Electrical Repairman	685.10	E-5	1	1	
Sr Propeller Rotor Repairman	684.10	E-5	1	1	
Aircraft Engine Repairman	681.10	E-4	3	3	
Airframe Repairman	686.10	E-4	2	2	
Airplane Repairman	672.40	E-4	3	3	

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Appendix 2 to ANNEX C -- Recommended aircraft maintenance and service team(cont'd)

DUTY	MOS	GRADE	ARVN	US
Electrical Repairman	685.10	E-4	1	1
Hydraulic System Repairman	687.10	E-4	2	2
Propeller & Rotor Repairman	684.10	E-4	2	2
Aircraft Parts Specialist	766.10	E-4	1	1
Aircraft Parts Specialist	760.00	E-3	1	1
Tool Room Keeper	680.00	E-3	1	1

Aircraft Maintenance and Service Team (Recommended)

UNIT DESCRIPTION	ARVN	US	REMARKS
Decontaminating apparatus portable 1½ qt	9	9	
Compass magnetic lensatic 1.58 in dia card	1	1	
Extinguisher fire hand charged 15 lb	6	6	
Flashlight plastic right angle 2 cell miniature flange lamp waterproof	5	5	
Generator set gas eng 1.5 KW 60 cy 1ph 2 wire AC 120V skid mtd	1	1	
Light set gen illumn 25 outlet	1	1	
Bayonet knife w/scabbard for 7.62 MM rifle	30	30	
Pistol auto cal .45	1	1	
Rifle 7.62 MM semiauto lt barrel	29	29	1 per MM
M-60 Machine gun 7.62 MM	2	2	
Semitrailer van cargo 12 ton 4-wheel	2	2	
Shop field maintenance spare parts storage set Nr 2	1	1	
Truck utility, ¼ ton 4X4	1	1	
Truck cargo 3/4 ton 4X4	1	1	
Truck cargo 2½ ton 6X6 LWB w/WN	2	2	
Truck tractor 5 ton 6X6 SWB	6	6	
Trailer, cargo ¼ ton, 2-wheel	1	1	
Trailer, cargo, 1½ ton 2-wheel	1	1	
Truck wrecker med 5 ton w/winch	1	1	
Trailer, cargo 1½ ton 2-wheel	2	2	
Watch wrist grade II	3	3	
Case field office machine plywood	1	1	
Cook set field	7	7	
Heater duct type portable gas eng	1	1	
Goggles sun 2 plastic 1 colorless 1 polorized green	9	9	
Stove gas burner 1 burner 5500 BTU	7	7	
Table folding legs wood solid top wood legs 36L 24W 27 25/32 H	1	1	
Tent maint frame type with liner frame pins	1	1	
Typewriter nonportable 14-15 in carriage	1	1	
Generator set gas eng trailer mtd PU-290/MR	2	2	
Generator, diesel, 15 KW, 2-wheel PU 402/M	1	1	
Shop set acft maint ‡tlr mtd tool crib elec flaw det	1	1	
Shop set acft maint ‡tlr mtd A-2 sheet metal welding hydraulic	1	1	
Shop set acft maint ‡tlr mtd B-4 machine and eng shop	1	1	
Shop set acft maint ‡tlr mtd B-5 propeller and rotor	1	1	
Shop set grd hdlg and servicing fld maint army acft set A	1	1	
Tool kit airframe repairmans army acft	3	3	
Tool kit electrical repairmans army acft	2	2	
Tool kit eng and power train repairmans	4	4	
Tool kit, acft inspection, technical	2	2	
Tool kit, propeller and rotor repairmans	3	3	
Tool kit, hydraulic repairmans army acft	2	2	

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Appendix to ANNEX C -- Recommended aircraft maintenance and service team (cont'd)

UNIT DESCRIPTION	Recommended Additions ARVN	US	REMARKS
Kit, tool general mechanics	4	4	
Tool set, org-maint, aircraft set A	1	1	
Tool set, org-maint acft set A supplement	1	1	
Crane type A7A, hoisting portable	1	1	
Table, field folding	1	1	
Desk field folding	6	6	
Mask protective field	30	30	
Cleaner vacuum, industrial	1	1	
Parachute stand	1	1	
Parachute tables	4	4	
Sewing machine light duty	1	1	
Suit integrated torso harness	1	1	
Life preserver, MK IIIC	1	1	
Mask, protective field	7	7	
Airplane, Utility	1	1	

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